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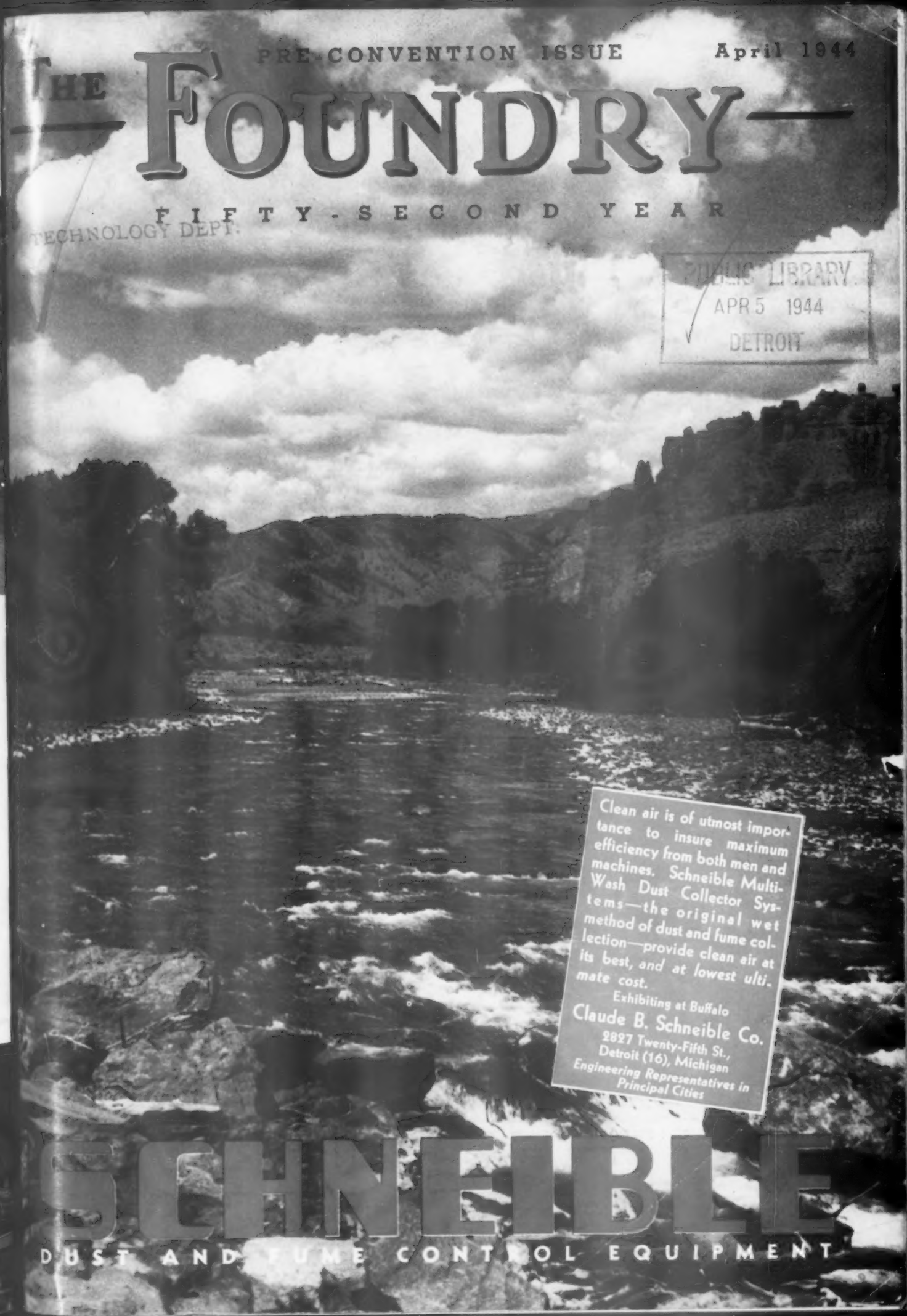
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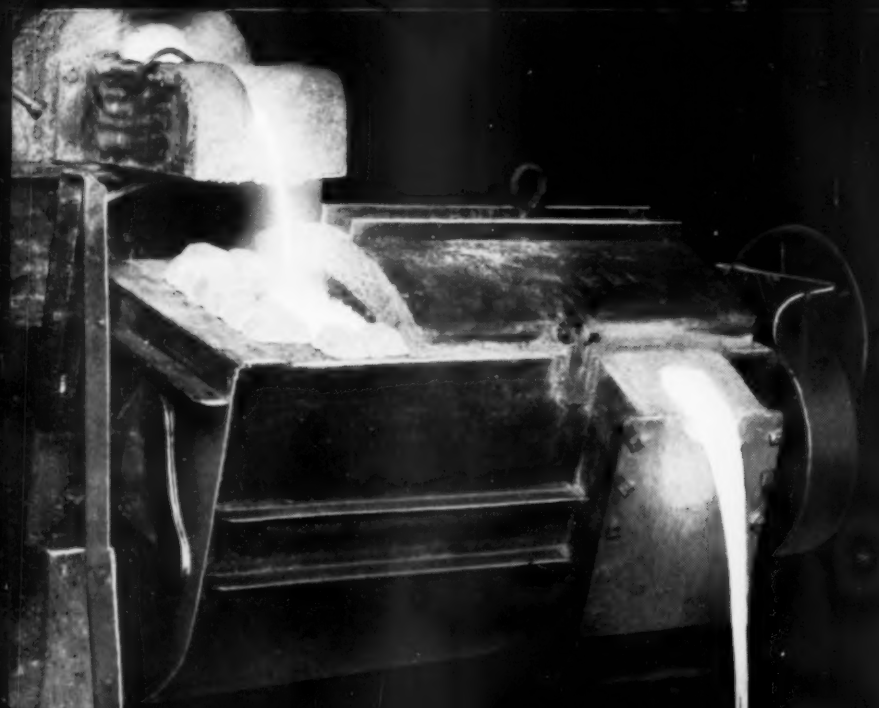

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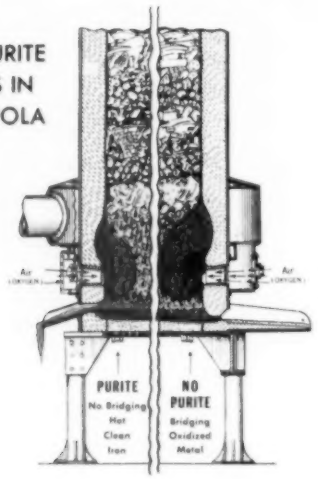
HOW PURITE WORKS IN THE CUPOLA



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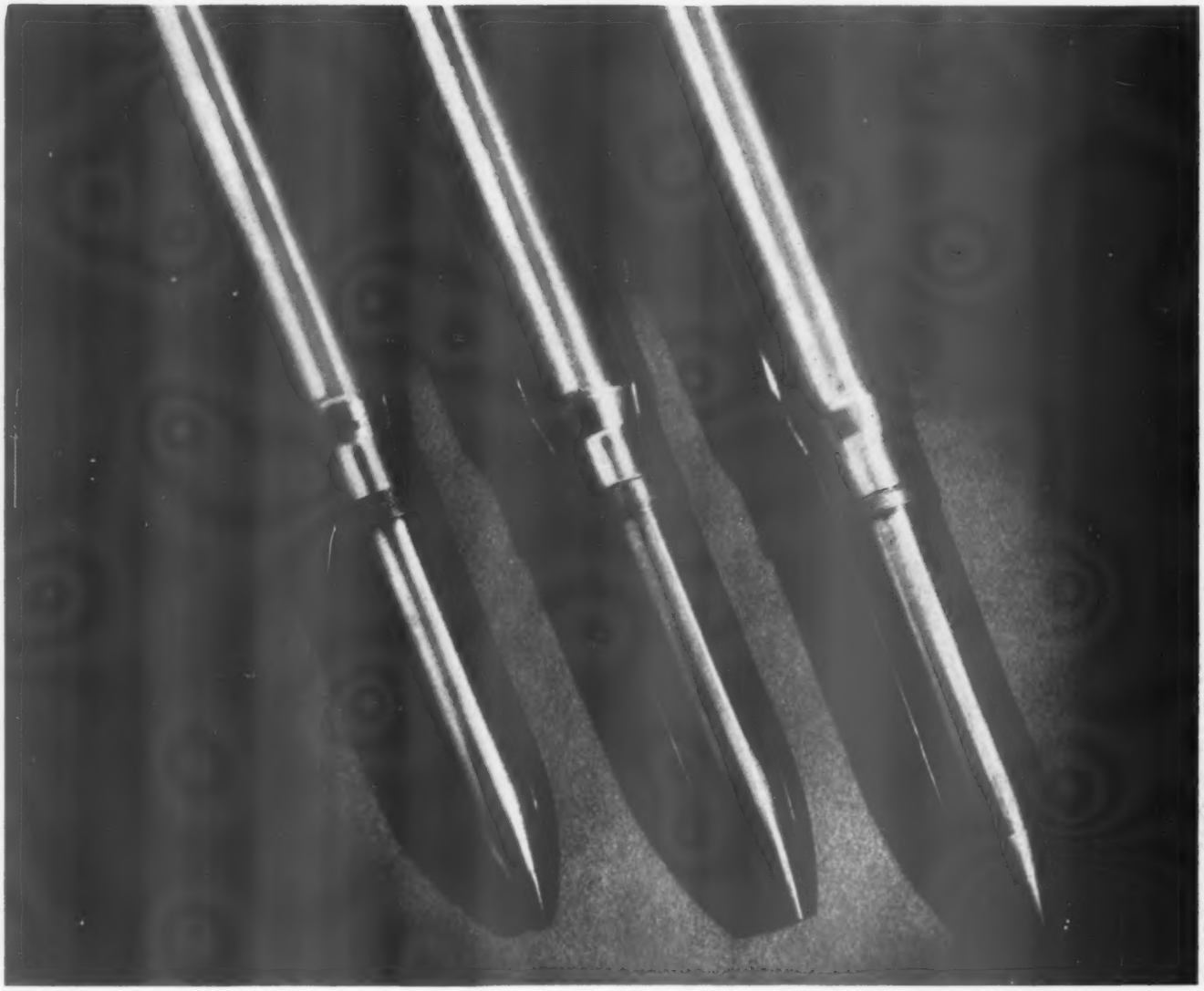

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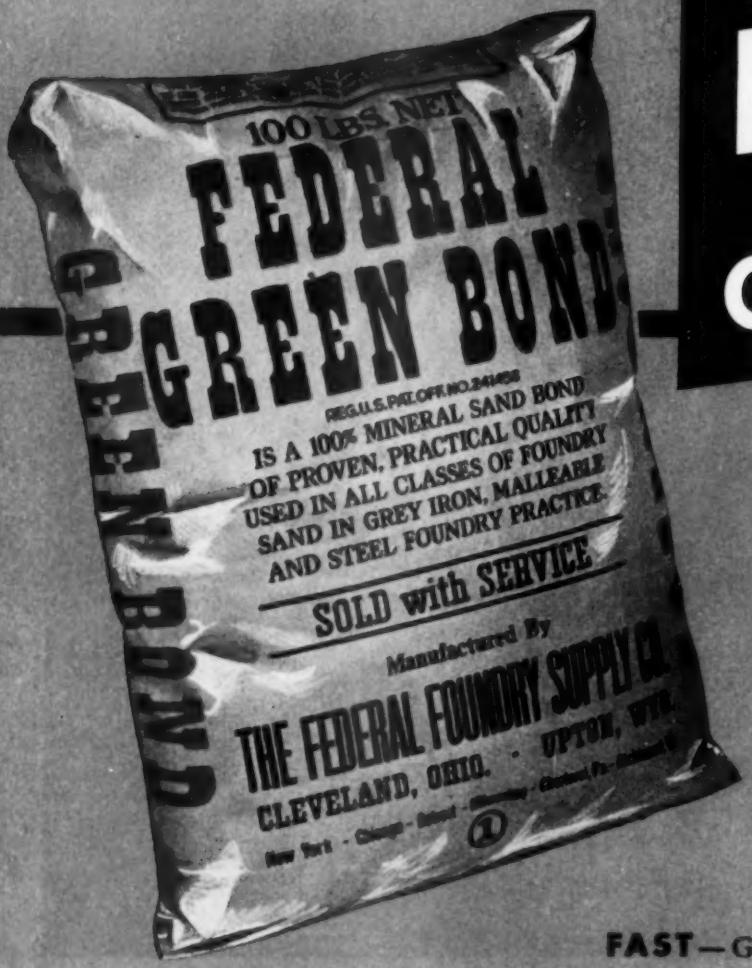

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for APRIL 1944

VOLUME 72 NUMBER 4

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THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and General Manager; RUSSELL C. JAENKE, Vice President; FRANK G. STEINEBACH, Vice President and Secretary, and EDITH L. WERNER, Assistant Treasurer.

Subscription: In the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $2.00; three years, $5.00. Single copies 25 cents. Copies published three months or more previous to date of current issue, 50 cents.

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Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879.

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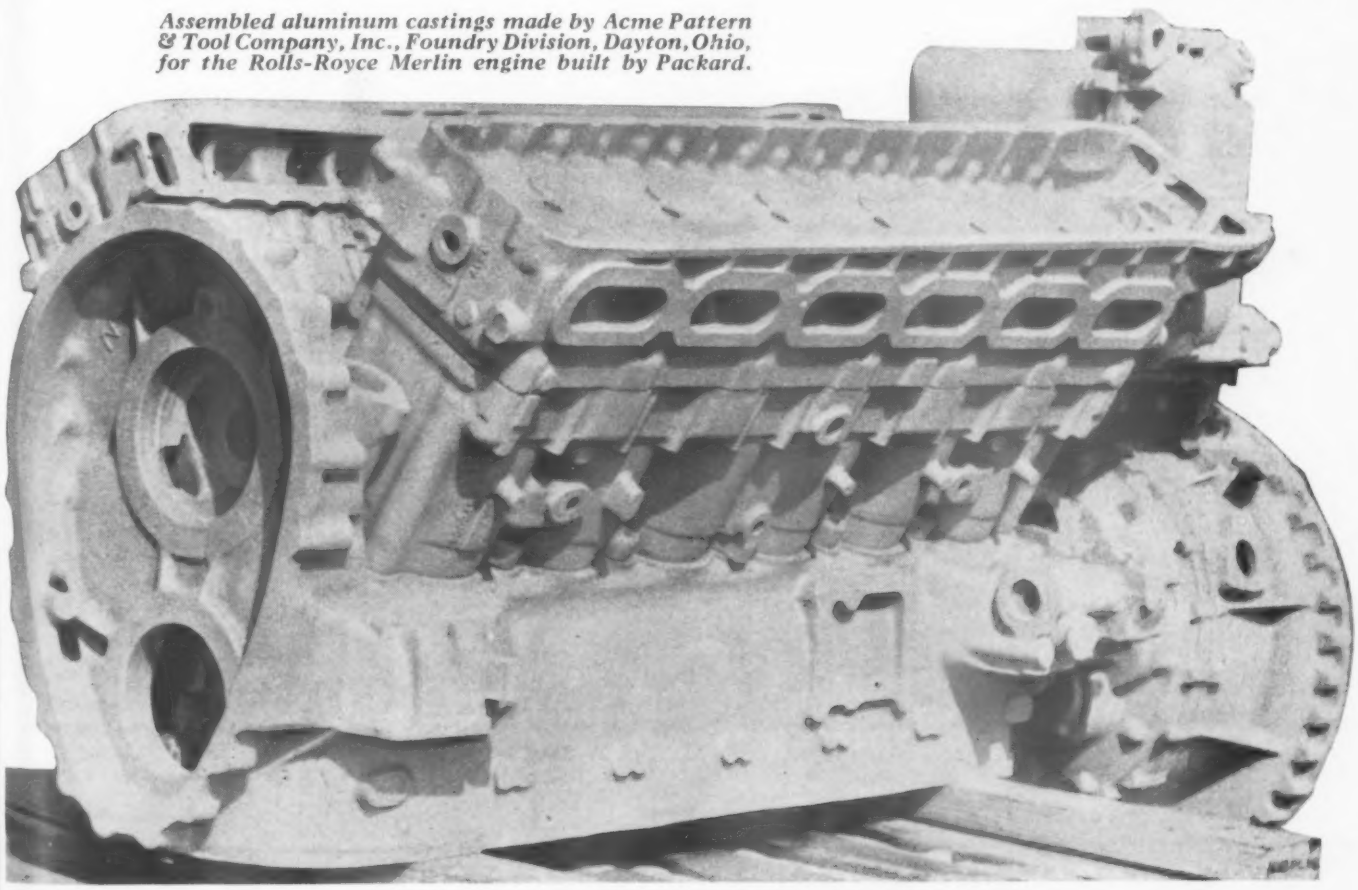

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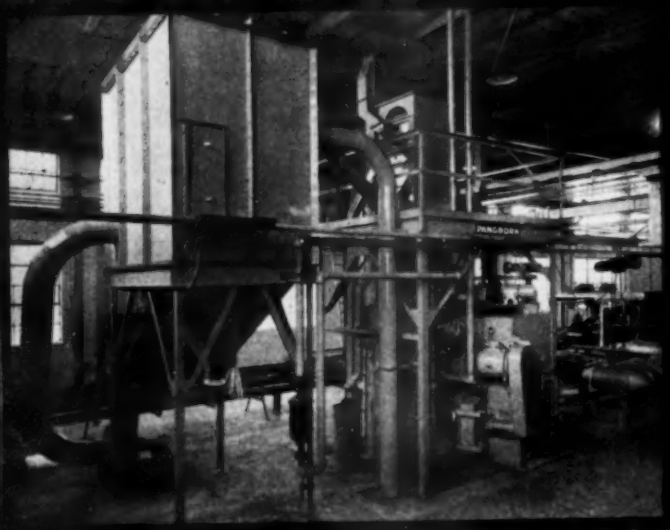

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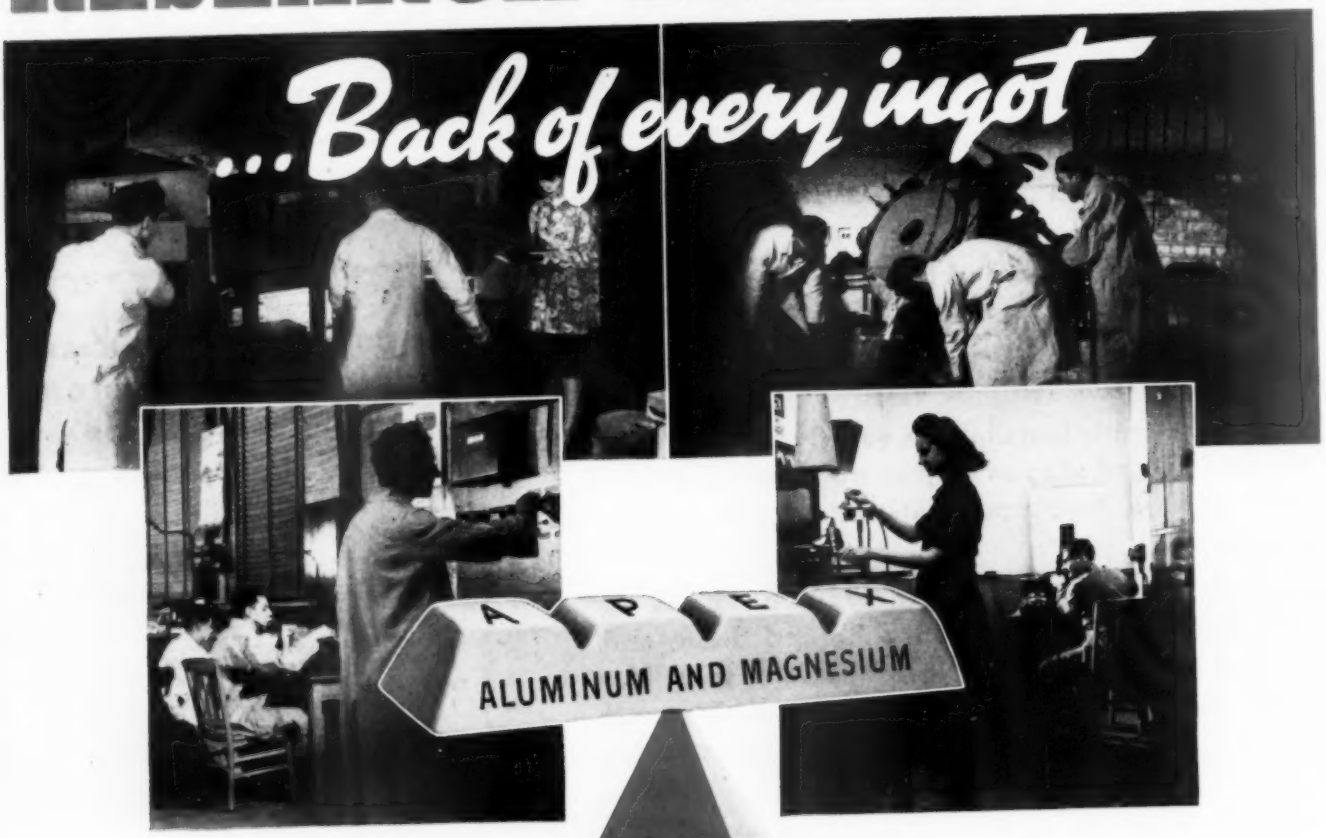

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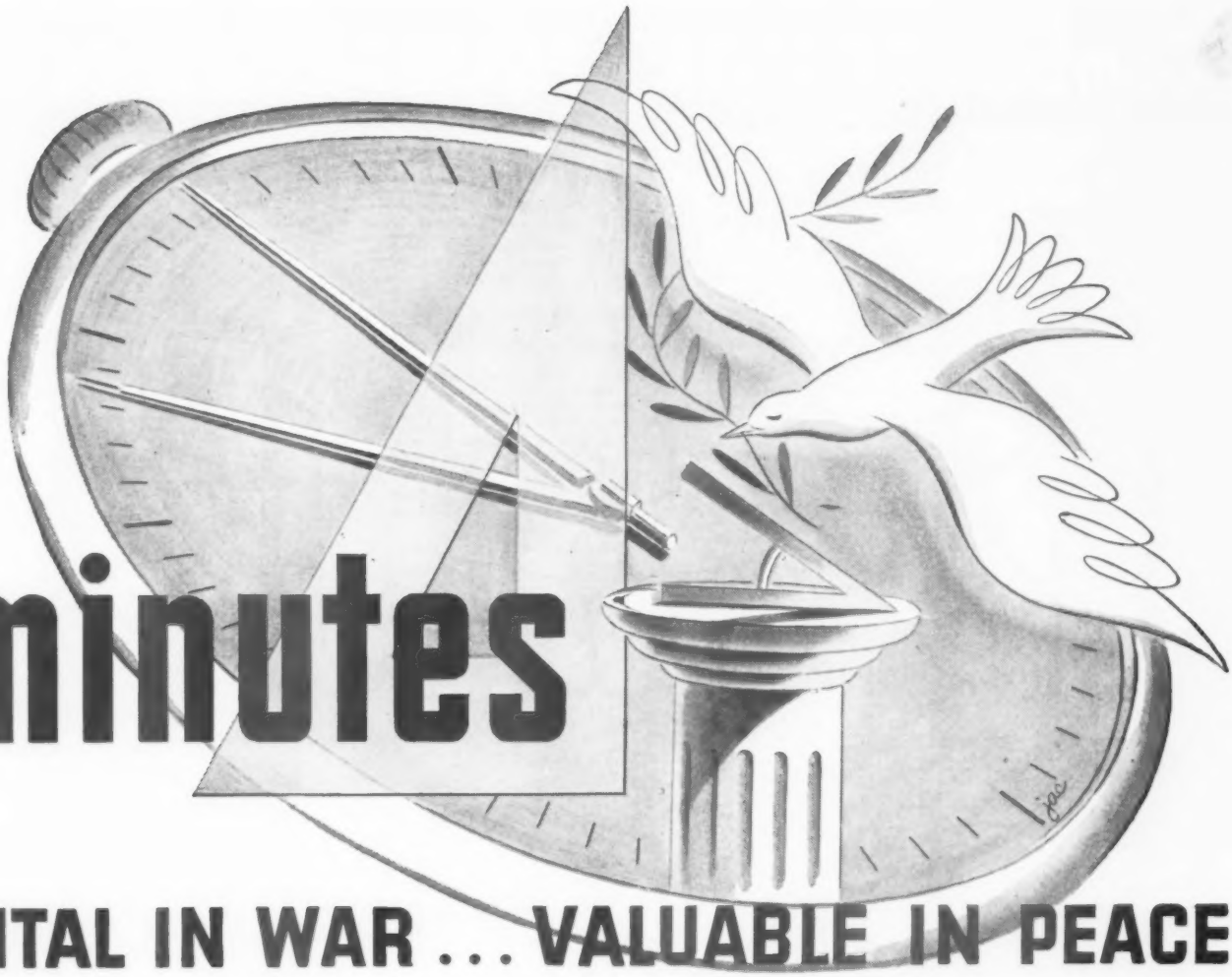

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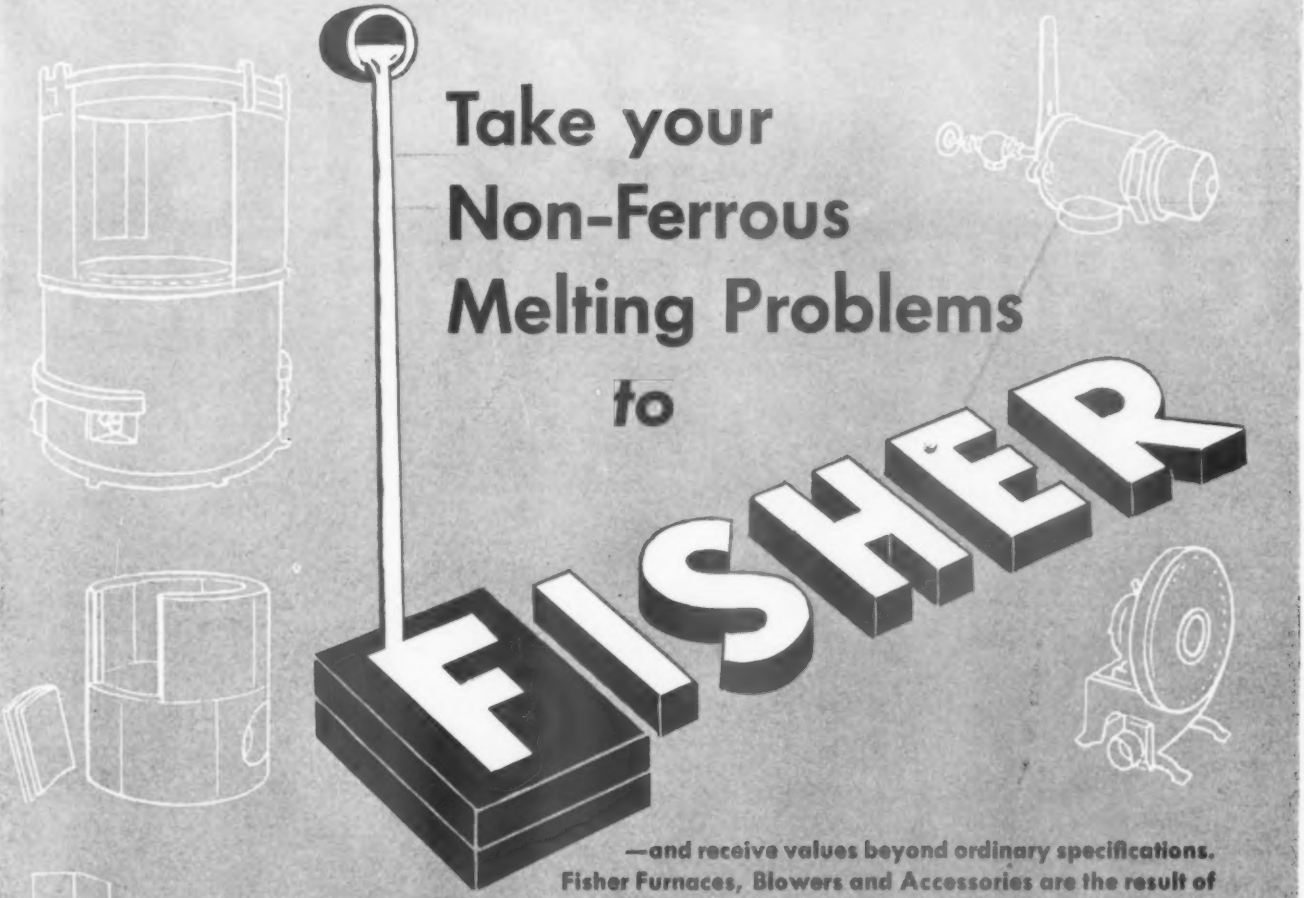

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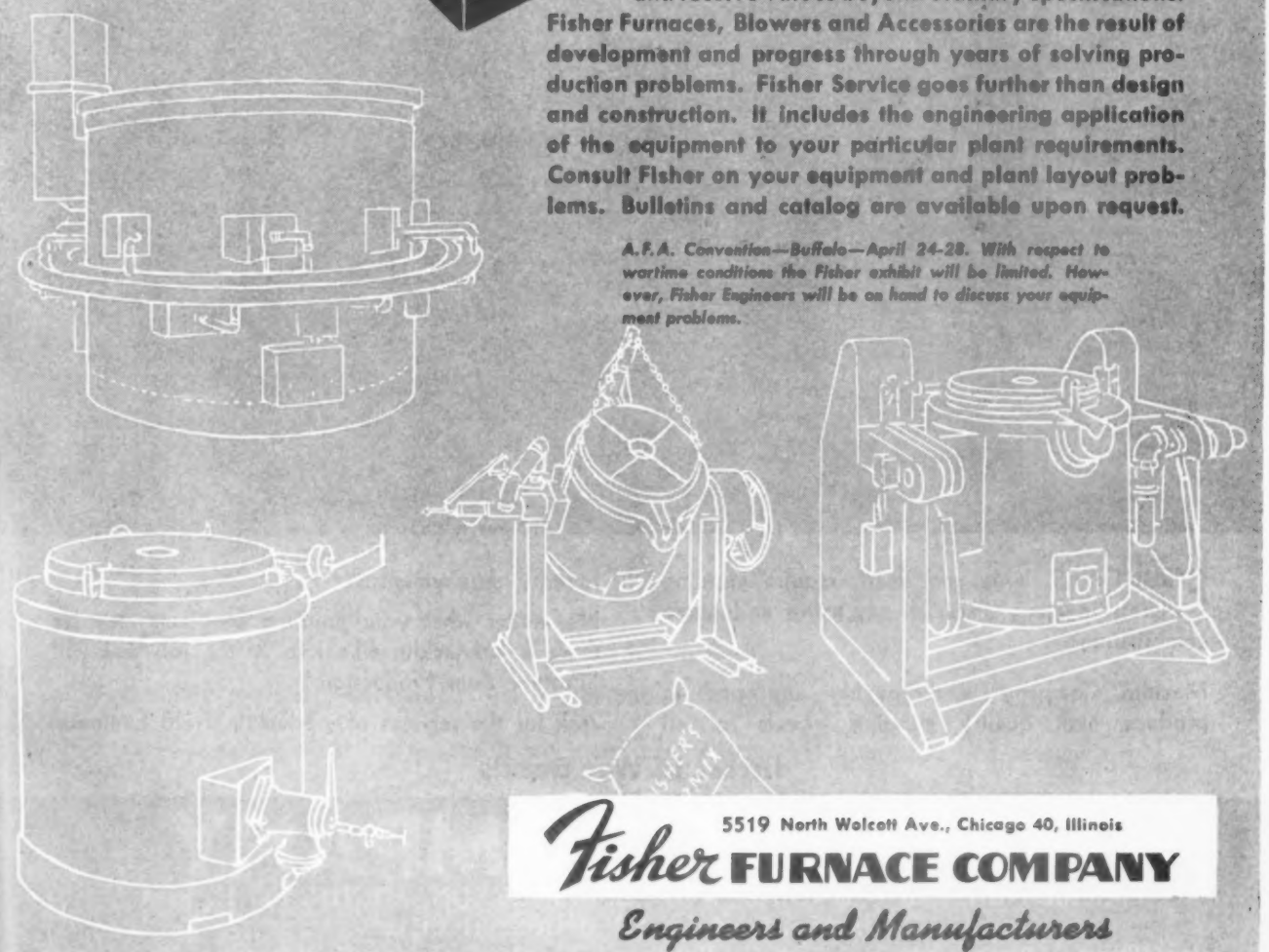

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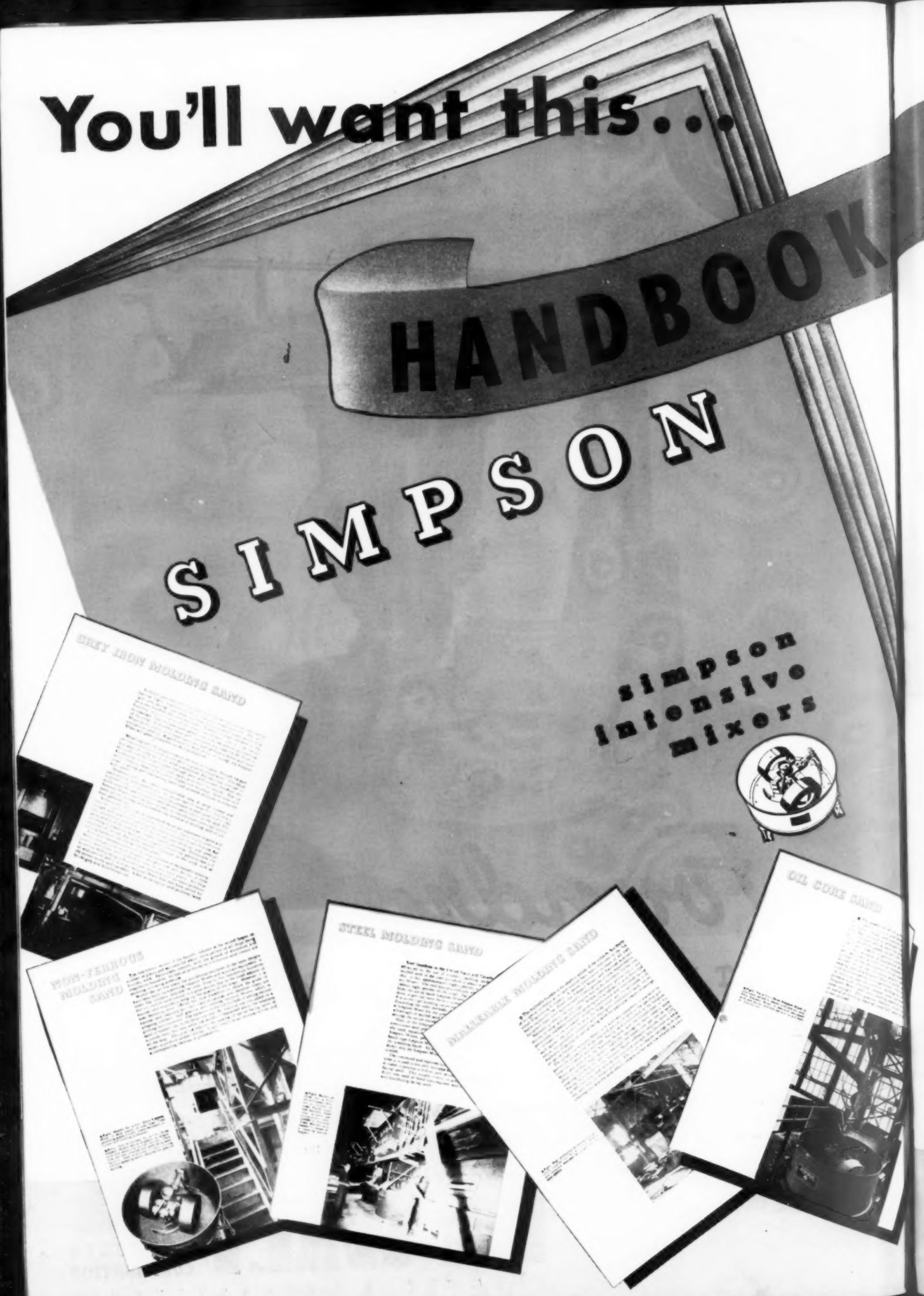
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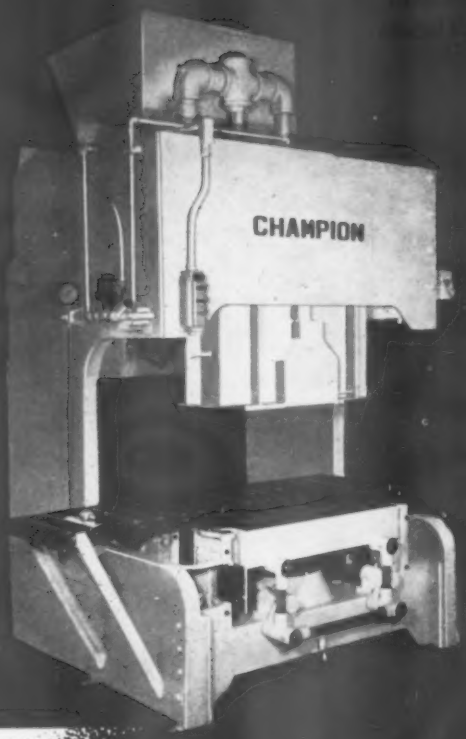

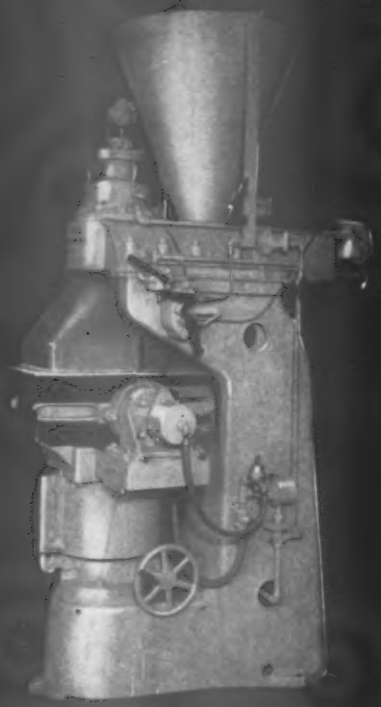

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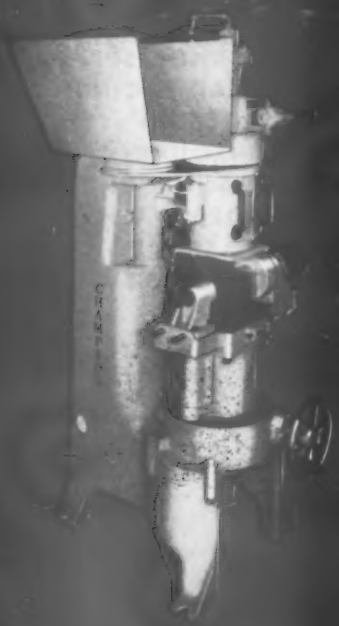

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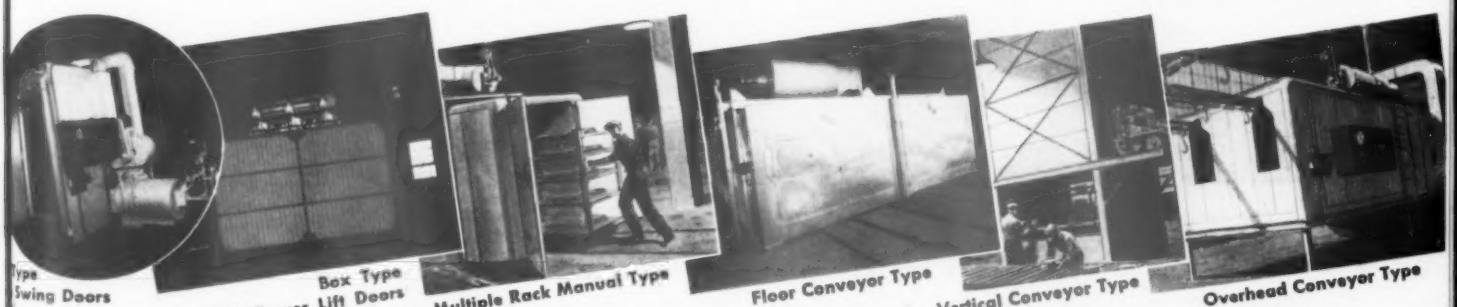
At the American Foundrymen's Show, in Buffalo, you will have an opportunity to see the Mahon *Hydro-Foam* Dust Collector in actual operation. You can start it and stop it yourself —see with your own eyes how wonderfully effective the *Hydro-Foam* principle of dust elimination really is—the principle that makes possible *completely automatic performance*— that requires no pumps, no spray nozzles, no cloth screens — that has nothing to wear out or get out of order. On display, also, will be a complete showing of Mahon Core and Mould Baking Ovens —and many other items of foundry equipment that you are sure to find of interest. A cordial welcome awaits you. Don't forget— booths 121 and 123. We'll be looking for you.

. . . *also* THE COMPLETE LINE OF MAHON CORE OVENS

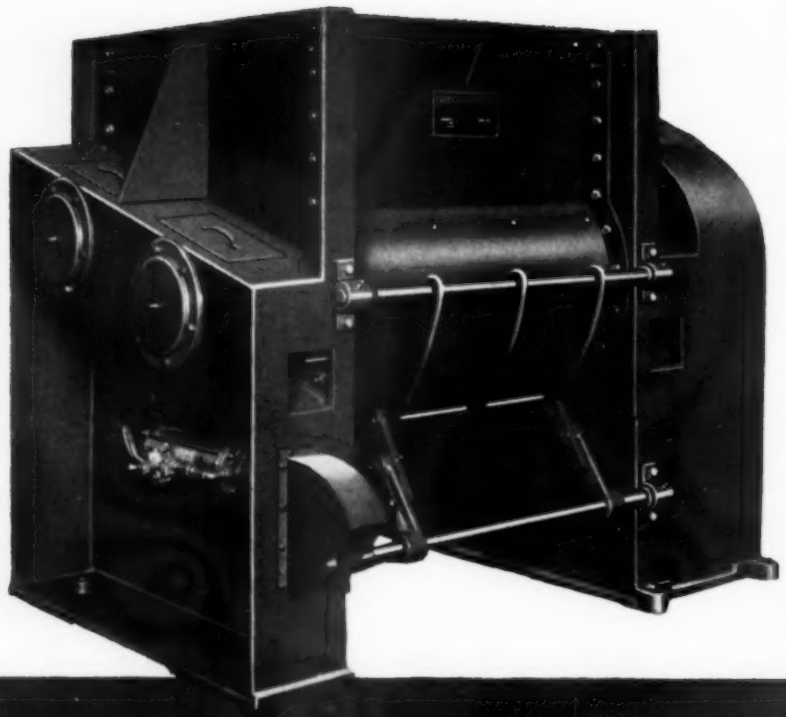


THE R. C. MAHON COMPANY

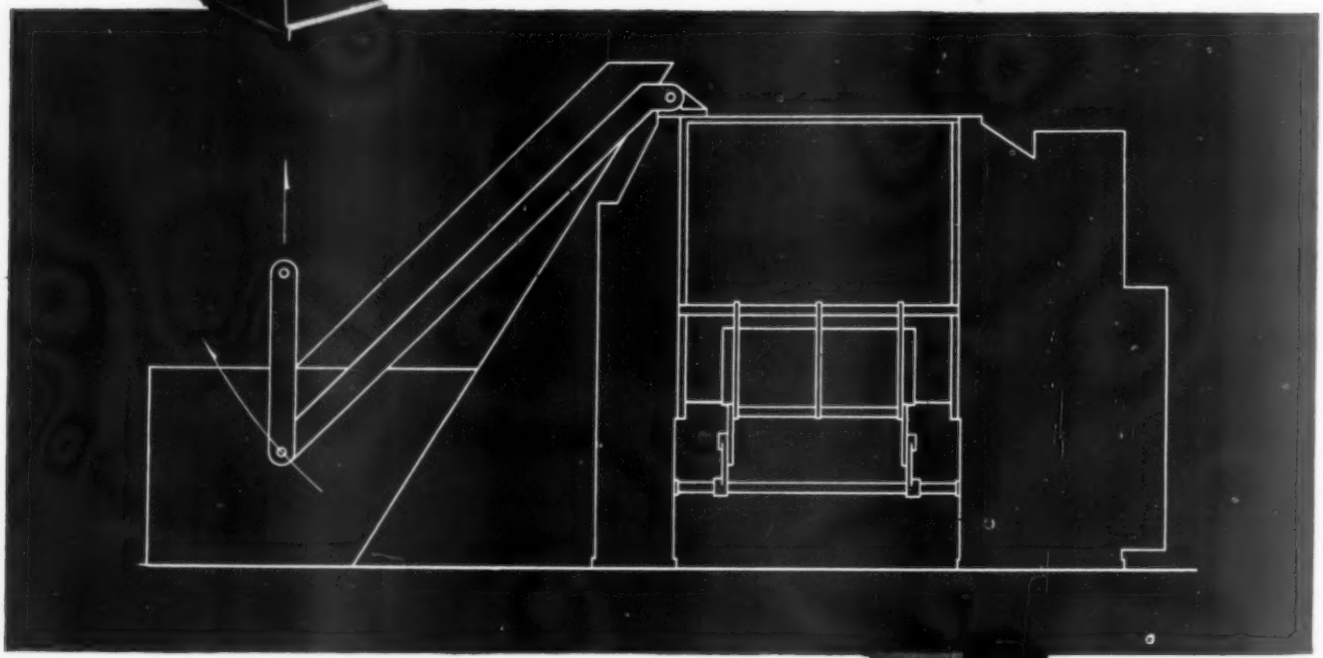
DETROIT — CHICAGO

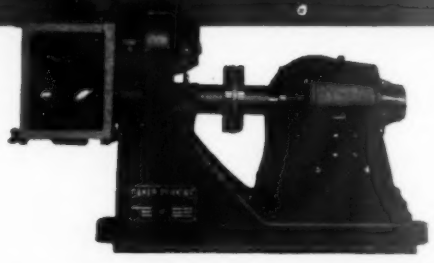
Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems

UNIFORM • SPEEDY CORE SAND MIXING WITH A BAKER PERKINS "UNIDOR"



If you're interested in improving your castings and reducing spoilage by improving the character of your core sand, it will pay you to use the Baker Perkins "Unidor" Core Sand Mixer. Adaptable to or available with, an air or electrically operated skip hoist (see blueprint) Baker Perkins mixers rub, stir and knead—all in one operation. They do not require special aerating attachments. They distribute uniformly a thin layer of bond around each of the sand grains so that you get 100% benefit from the bonds, binders, oils, sea coals, pitch or other compounds that you use. And because the silica grains are not broken up, the mixed sand has a high degree of permeability. The mix is homogeneous and does not require riddling. Little or no maintenance is required other than routine lubrication and occasional replacement of steel liners and hardened steel wearing shoes. For further facts about B-P Core Sand Mixers, Laboratory Mixers, Automatic Flow Control meters, Sand Scales, Batch or Continuous Mullers for molding sand, write to Baker Perkins Inc., Chemical Machinery Division, Saginaw, Michigan.



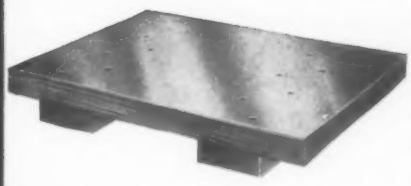


Right: Baker Perkins 1500 to 2000 gram laboratory mixer. Any mixing done in this unit can be duplicated—on a production basis—in the large B-P Foundry Mixer shown above. The production mixers, with motor mounted at rear as an integral part of the unit, are available in 5.5, 13, or 21.5 cubic feet working capacity.

BAKER PERKINS BUILDS EFFICIENT FOUNDRY EQUIPMENT

CMD FOUNDRY SPECIALTIES

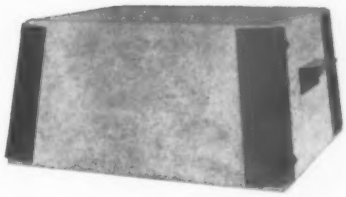
Save Time and Reduce Costs



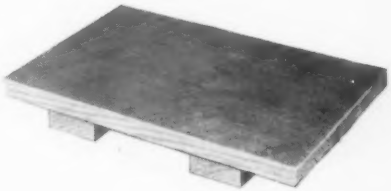
CMD FIRE-RESISTANT BOTTOM BOARDS

CMD WOOD FLOOR FLASKS

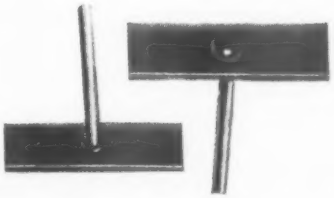
TRI-PLY FOUNDRY RIDDLE



CMD NON-WARP, NON-BURN COMPOSITION JACKET



CMD WOOD BOTTOM BOARD

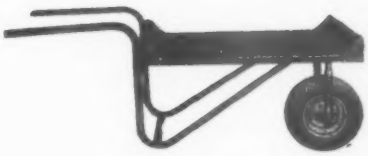


SLAG SKIMMING AND RABBLING IRONS

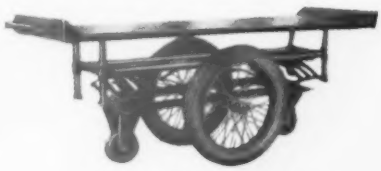
CMD TYPE A CHIPPING HAMMER
Combination drift and chisel

CMD TYPE C CHIPPING HAMMER
For general hand chipping

TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel (as shown here) or two wheels



CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

Foundries have been relying on CMD for time-saving, labor-saving supplies and equipment for 23 years. Write now for catalog on the complete CMD line!

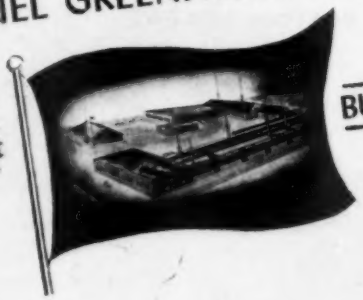
Manufacturers of a complete line of core-conveying equipment and other foundry specialties

CHICAGO MANUFACTURING & DISTRIBUTING CO.

Dept. 4F, 1928 West 46th St. • • **Chicago 9, Illinois** • •

SAMUEL GREENFIELD CO., INC.

31 Stone Street



BUFFALO 12, N. Y.

AN INVITATION!

All consumers and all those interested in the metallurgy and production of aluminum, brass and bronze ingots, who are delegates to the Third War Production Foundry Congress, are cordially invited to inspect our modern smelting plant. Personally conducted tours from the convention hall to our plant will comply with the Congress time table.

Make reservation for the tour at the Greenfield Booth, No. 482, in the convention hall.

Samuel Greenfield

Welcome to BUFFALO, N. Y.

THIRD WAR PRODUCTION FOUNDRY CONGRESS

APRIL 25th to 28th

A NEW MACHINE;

JOLT SQUEEZE, PIN LIFT, MOLDING MACHINE

. . . FAST ACCURATE DRAW

Accepted and tried by leading foundrymen and acclaimed to be an efficient, sturdy and modern machine. Simple, rugged construction, insures continuous production. The base and squeeze cylinder is a heavy one piece, semi-steel casting. All pins and bushings are case hardened and ground to size.

This machine is provided with an interlocking means which insures the head being in the squeezing position before the squeeze valve can be operated. Has a 14″ diameter squeeze piston, 6″ diameter jolt piston, table 18″ x 26½″, adjustable draw 3″ to 6″, lift pin centers side to side 16″, front to back adjustable 13″ to 21″.

Your inquiries are solicited. One of our engineers will call at your request.

Type 14-PL Heavy Duty Jolt Squeezer with Pin Lift Pattern Draw.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND 18, NEW YORK

Established 1910

Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

NICHOLLS

Simplicity

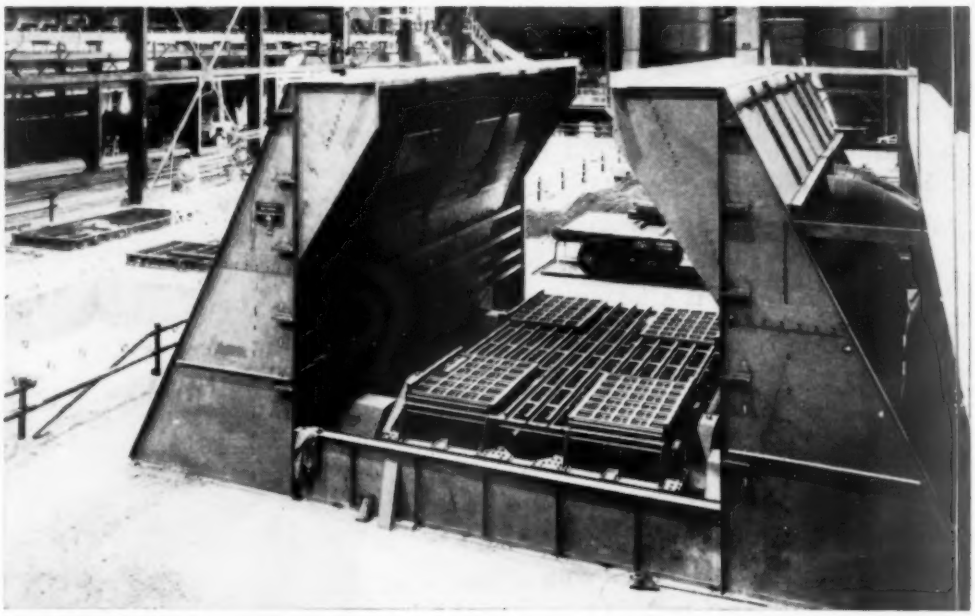
QUAD SHAKE-OUTS

DO GIANT'S WORK!

☆

The Simplicity Quad Shake-Out, shown by cut, is operating in a Western Foundry where only Proven Equipment was installed

☆



SIMPLICITY QUAD SHAKE-OUTS are operating today in many foundries producing large castings for war work. One such job is the unit cast tank hull, which with flask and sand weighs around 170,000 pounds. The flask is shaken out and the core sand knocked out of the hull casting in the total elapsed time of only ten minutes.

Quad Shake-Outs have been built in sizes ranging from 10′ x 10′ to 15′ x 22′ in vibrating area. Special deck areas can be supplied for special jobs. The positive blows struck against the flask or casting by the massively constructed vibrating units assure fast and certain movement of the sand, no matter how hard it is baked.

Our engineering representatives will check your job and recommend the proper equipment.

"PURCHASE SHAKE-OUT CERTAINTY AND ASSURED SERVICE"

Simplicity Engineering Company

DURAND, MICHIGAN

FOR CANADA: Waterous Limited, Brantford, Ontario

WILL YOUR FOUNDRY MAKE A PROFIT *Tomorrow?*

Here's How Despatch Oven and Furnace Engineering Service Can Help You Do It!

It's not going to be easy to make money tomorrow. But you'll stand a better chance if you maintain good customer service, high quality and keep production costs down.

Despatch engineers can help you do this. With 42 years of experience as specialists in foundry service, they can recommend the *best* Despatch foundry ovens and heat treating furnaces to suit your needs. You'll save labor . . . save time . . . save space . . . save fuel, on every job you handle.

These savings, added to exceptional performance, will help assure efficient, economical production — which is just what you'll need most tomorrow.

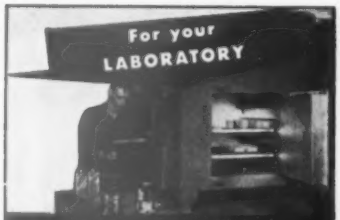
Save on 3 Foundry Jobs

In your laboratory, use Despatch ovens to test core sands, oils and binders. Get accurate data quickly; no wasteful full-scale tests in big ovens. Ideal for checking incoming raw materials. Four standard sizes; gas or electric. Prompt delivery. *Ask for Bulletin 105*

In your foundry use fast-baking, easy-loading, space-saving Despatch ovens for maximum performance. Types for core-baking and pasting, and for mold drying. You get the oven *best* suited to your needs, "foundry fitted" to the job. All types of conveyors, rack, batch and drawer-type ovens for large or small foundries. Plan to save more with a Despatch oven. *Ask for NEW Bulletin 31.*

In your heat treat department get results you want on every batch with a Despatch furnace. Stress-relief units for ferrous work; performance-tested heat-treating units for ferrous and non-ferrous use. Speedy, uniform, accurate and flexible; for temperatures to 1750° F. Completely automatic. Latest loading, handling, quenching systems. All types: pit, batch, rack-loaded, conveyor, auto-quench robot controlled models, etc. *Write for Bulletin 81 today!*

Visit the DESPATCH BOOTH at the FOUNDRY SHOW!



LABORATORY oven for testing.

VERTICAL conveyor core oven.

HORIZONTAL conveyor core oven.

CAR-LOADED Despatch core oven.

RACK TYPE Despatch core oven.

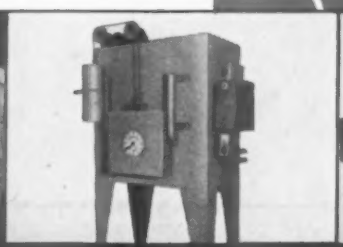
ROLLING DRAWER core oven.

PLATFORM loaded Al. type furnace.

RACK LOADED heat treat furnace.

DESPATCH OVEN COMPANY MINNEAPOLIS

CAR-bottom stress relief furnace.

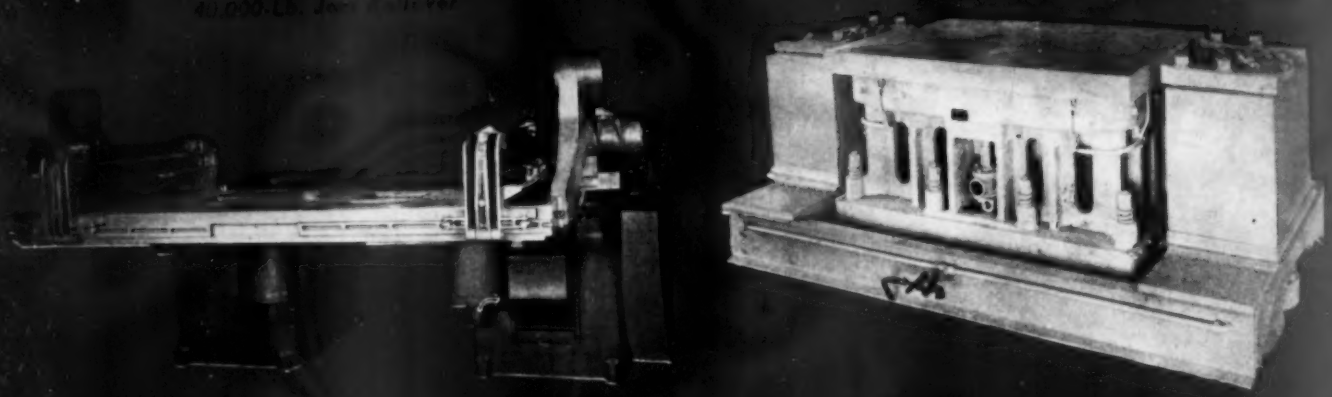


BATCH TYPE heat treat furnace.

PIT TYPE heat treat furnace.

HERI

A HERMAN TO MEET EVERY MOLDING REQUIREMENT GR



HERMAN

MAN

NT GREATER SPEED · GREATER ECONOMIES · GREATER PROFITS

MOLDING MACHINES

for greater war production now
for greater profits

Royer Sand Conditioners are helping an imposing list of foundries with outstanding war production records to deliver more and better castings for America's war machine. At the same time, these Royers are reducing costs—which will make them an important factor in post-war profits.

Only the Royer assures this proper six point sand conditioning:

Thorough refuse removal
Positive lump breaking
Complete blending and mixing
Even distribution of moisture
Increased permeability
Double aeration — once on the belt and once as sand is being discharged

ROYERS *are sold only by foundry-trained engineers*

Royer representatives are qualified by adequate experience to advise you on the type of Royer best suited your operating conditions. They are thoroughly familiar with foundry sand, sand preparation and molding problems. When you need sand conditioning equipment, call an expert.

Mr. M. A. Beltaire, Jr.
7328 Hamilton Avenue
Detroit, Michigan

The Fenton Foundry Supply Co.
134 Gilbert Avenue
Dayton, Ohio

F. F. Shortsleeve Company
P. O. Box 459
Elmira, New York

William C. Edgar, Engineer
Oliver Building
Pittsburgh, Pennsylvania

Mr. Alexander Haigh
141 Milk Street
Boston, Massachusetts

Mr. James H. Hatten
17 N. Glenwood Avenue
Aldan, Delaware County
Pennsylvania

Chamberlain Co., Inc.
4700 District Boulevard
Los Angeles, California

Mr. Frank Robbins, Jr.
P. O. Box 694
Chattanooga, Tennessee

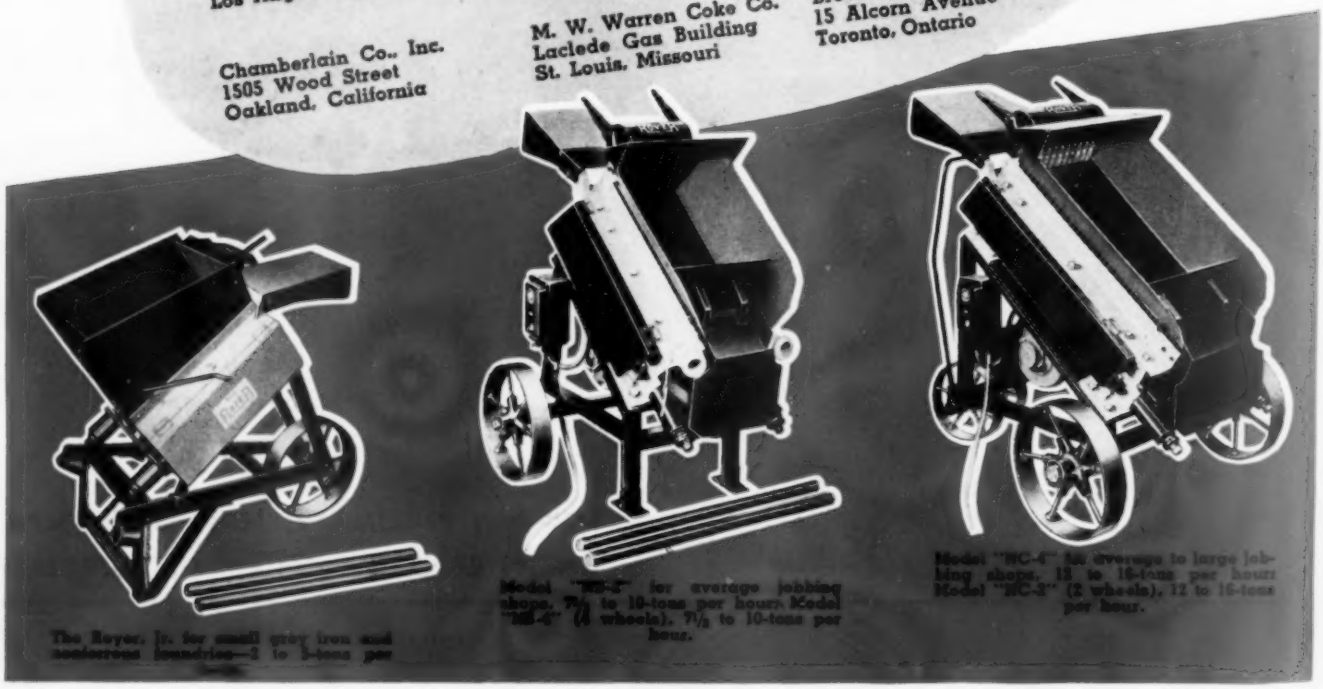
Mr. C. D. Hollins
1033 West Loyola Avenue
Chicago, Illinois

Chamberlain Co., Inc.
1505 Wood Street
Oakland, California

M. W. Warren Coke Co.
Laclede Gas Building
St. Louis, Missouri

Western Foundry Sand Co.
1039 Elliott Avenue, West
Seattle, Washington

For Canada
Brown Engrg. Corp.
15 Alcorn Avenue
Toronto, Ontario



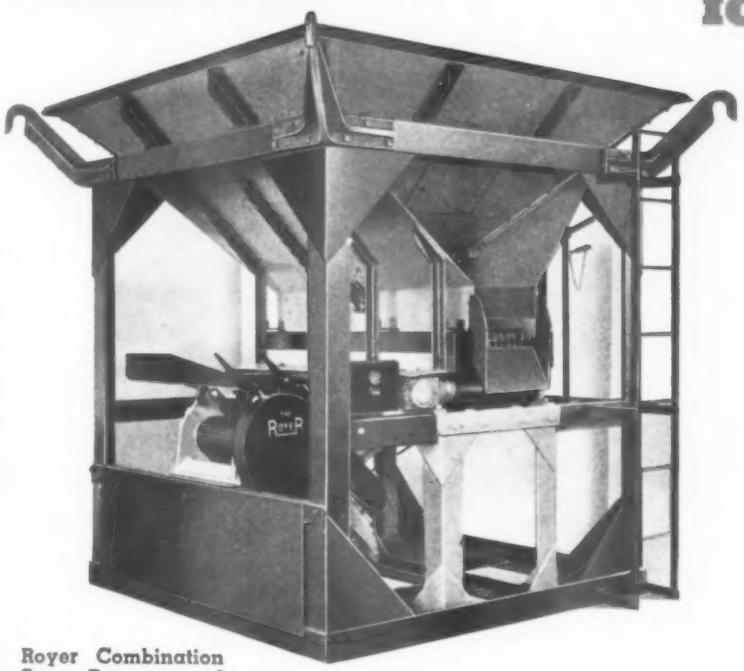
The Royer, Jr. for small grey iron and nonferrous foundries—2 to 5-tons per

Model "RC-4" for average jobbing shops. 7½ to 10-tons per hour. Model "RC-6" (4 wheels). 7½ to 10-tons per hour.

Model "RC-4" for average to large jobbing shops. 12 to 16-tons per hour. Model "RC-2" (2 wheels). 12 to 16-tons per hour.

There's a Royer Sand Conditioner for Every Foundry

tomorrow



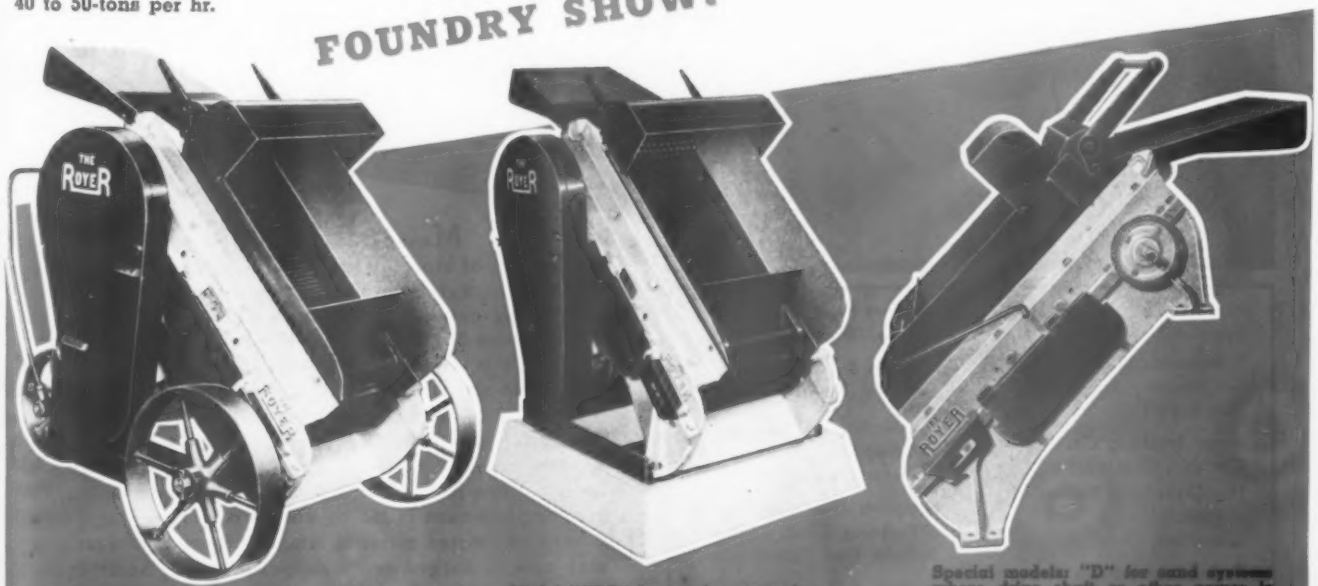
Royer Combination Scrap Remover and Sand Conditioner for medium to large steel jobbing foundries. Model "NDC," 20 to 25-tons per hour; Model "RC", 40 to 50-tons per hr.

Among the ten Royer models there is one which will fully meet the sand conditioning needs of every foundry —large or small—jobbing or production—ferrous or nonferrous. The Royer will help you eliminate discounts and increase your casting production with better conditioned sand.

Let us give you information on operating economies and delivery dates on your priority requirements.

Over 5,500 Royers Now In Use

SEE OUR EXHIBIT AT THE FOUNDRY SHOW!



Model "NDP" for medium to large size foundries. 20 to 30-tons per hour.

Model "NDS" for sand systems in production foundries. 20 to 30-tons per hour; Model "NRS", 40 to 50-tons per hour.

Special models: "D" for sand systems where drive shaft or other power is available. 20 to 30-tons per hour; "R", 40 to 50-tons per hour.

THE ROYER FOUNDRY & MACHINE CO.
KINGSTON, PENNSYLVANIA

FOREMOST IN SAND CONDITIONING EQUIPMENT

ALUMINUM, TOO, LIVES TO FIGHT AGAIN!

Many lives are being saved today by the transfusion of blood . . . from the workers on the home-front to the fighters on the battle-front. Our blood can now bring new life to the sick and wounded . . . can enable some boy out there to live to fight again another day. This is one of the wonders of medicine that is helping to shorten this war.

And one of the wonders of metallurgy is also helping to shorten this war. It is the re-enlisting of aluminum so that it, too, can live to fight another day. A bomber is shot down in flames . . . a tank is blown to bits . . . a gun emplacement is hit by enemy shells . . . and only a heap of twisted metal is left. Yet from that wreckage may now be forged new weapons that will hammer out new victories for the Allies.

We, the members of the Aluminum Research Institute, are producing these aluminum alloys . . . meeting the government's high standards of quality . . . so that aluminum can fight again till peace is won.

Aluminum and Magnesium, Inc.
Sandusky, Ohio

The American Metal Company, Limited
New York City

Apex Smelting Co.
Chicago, Illinois

The Cleveland Electro Metals Co.
Cleveland, Ohio

Federated Metals Division American Smelting and Refining Company
New York City and Branches

General Smelting Company
Philadelphia, Pennsylvania

William F. Jobbins, Inc.
Aurora, Illinois

R. Lavin & Sons, Inc.
Chicago, Illinois

The National Smelting Company
Cleveland, Ohio

Niagara Falls Smelting & Refining Corp.
Buffalo, New York

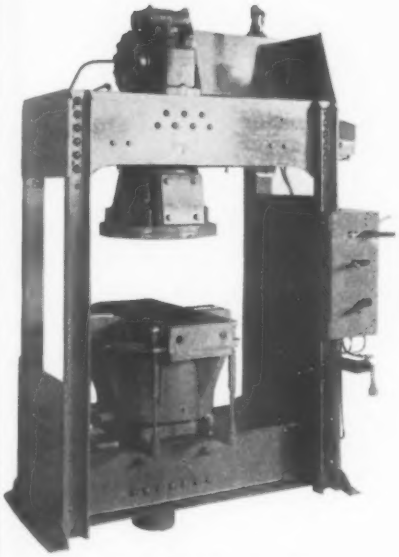
Sonken-Galamba Corporation
Kansas City, Kansas

U. S. Reduction Co.
East Chicago, Indiana

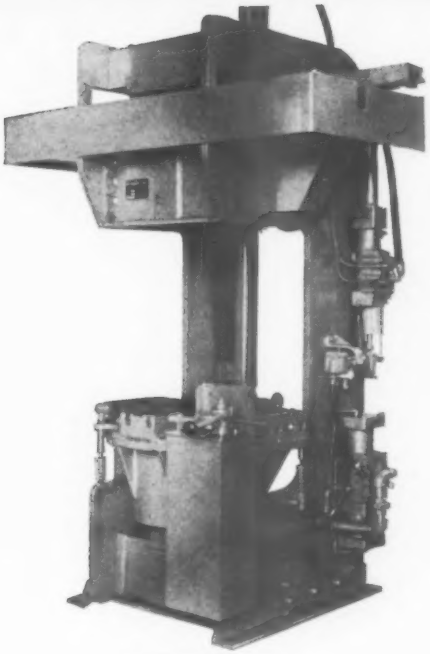
Aluminum Research Institute

111 West Washington Street, Chicago 2, Illinois

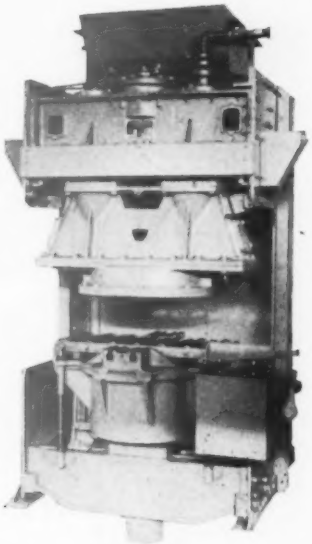
CORE BLOWERS Exclusively



DEMMLER No. 4E



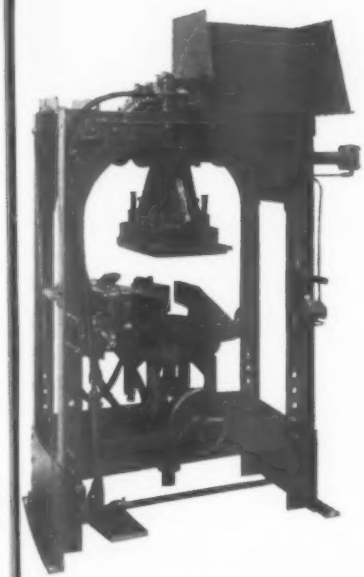
DEMMLER No. 8



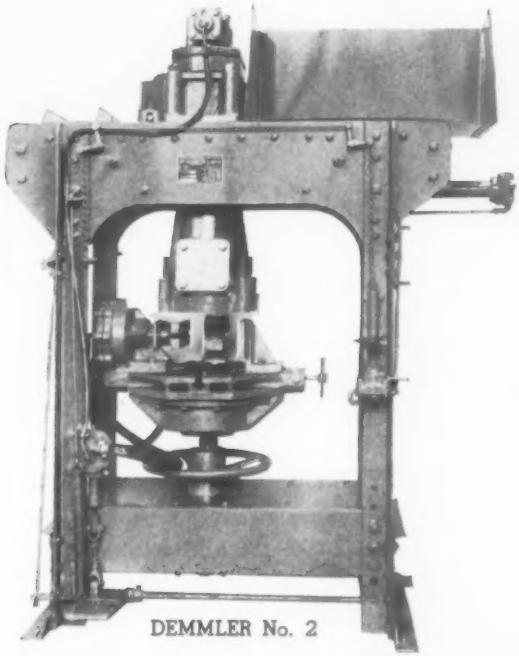
DEMMLER No. 5

Recent additions to our line are the No. 4E and No. 5 machines, designed for blowing cores for large airplane motor castings. Features include an accurate core box draw, table equipped with Timken rollers, control mechanism totally enclosed.

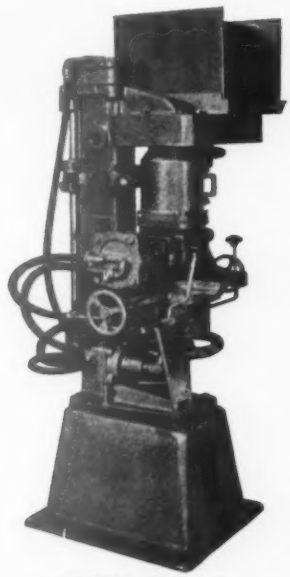
At this time we have capacity to make good deliveries, and suggest that you check with us on your anticipated requirements.



DEMMLER No. 1



DEMMLER No. 2

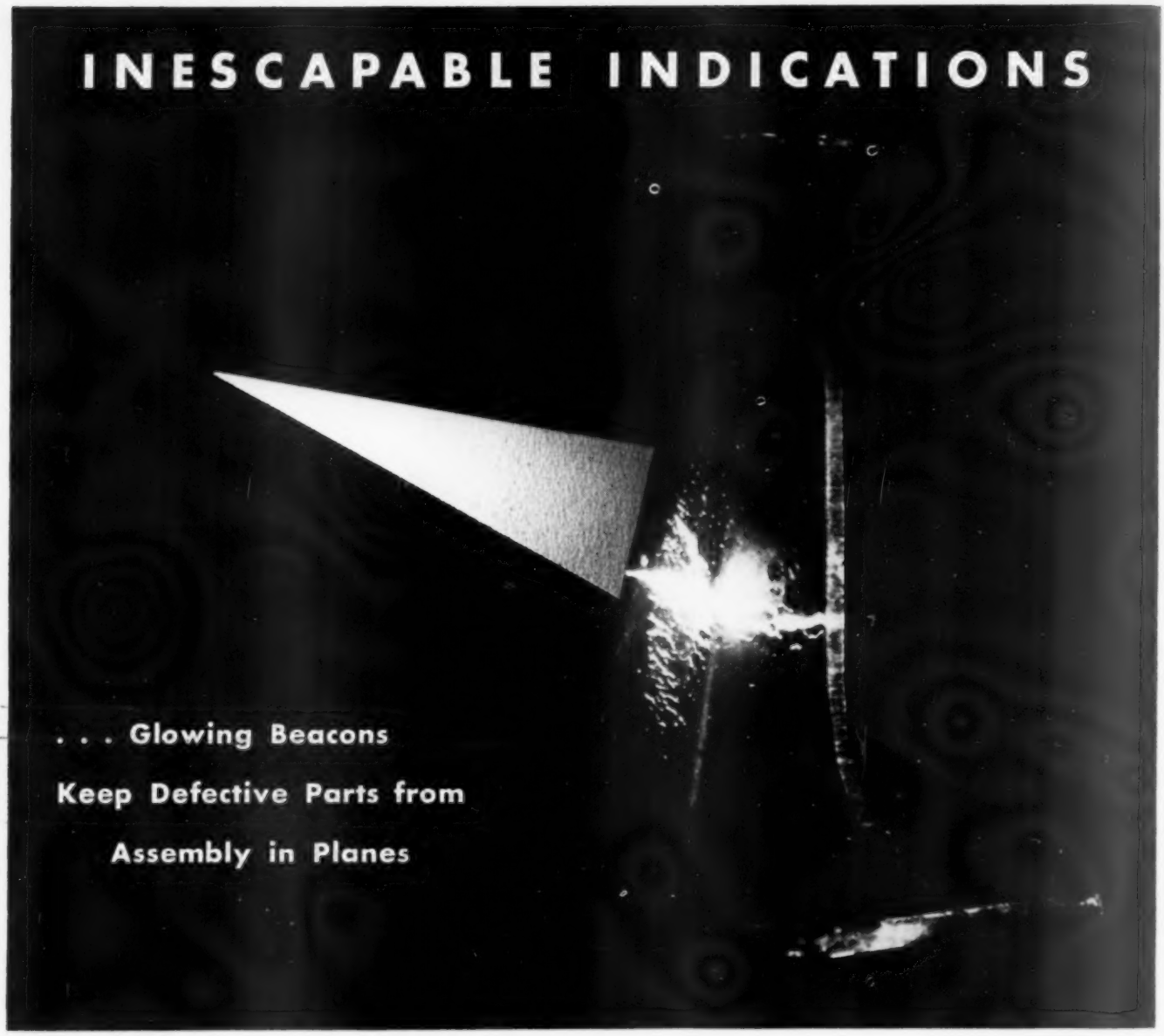


DEMMLER No. 0

WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

DEMMLER

INESCAPABLE INDICATIONS



. . . Glowing Beacons
Keep Defective Parts from
Assembly in Planes

MAGNAFLUX RESEARCH

Since the pioneering stage of the original Magnaflux Method for steel, our engineers have sought to extend the benefits of rapid non-destructive inspection techniques in every field. For the important foundry industry special portable equipment and new procedures for more sensitive results were developed.

● Weaknesses that threaten to develop in American armaments are discovered at home, in the factory, and not by the enemy shooting down crippled planes over the battlefield. This is a powerfull factor in our military strength.

Magnafux* Inspection of aircraft castings like the above, on a 100% basis, at production-line speeds, contributes significantly to the splendid performance record of American aviation.

The cast aluminum fitting shown here, when inspected under black light by the Magnaflux Corporation's Zyglo Method glowed with fluorescent indications of serious shrinkage cracks. To catch such defects in the foundry before passing them along offers huge savings. Not the least of these is reputation.

The Zyglo Method is being effectively used on all metals, nonmagnetic, and magnetic — particularly on aluminum and magnesium. Write for fully descriptive Zyglo Bulletin.

**Magnaflux — the Trade Mark of the Magnaflux Corporation applied to its equipment, materials and inspection methods.*

MAGNAFLUX CORPORATION
5918 Northwest Highway, Chicago 31, Illinois
New York · Detroit · Dallas · Los Angeles · Cleveland · Birmingham

G-IRON NEWS

PUBLISHED IN THE INTEREST OF ALL FOUNDRYMEN

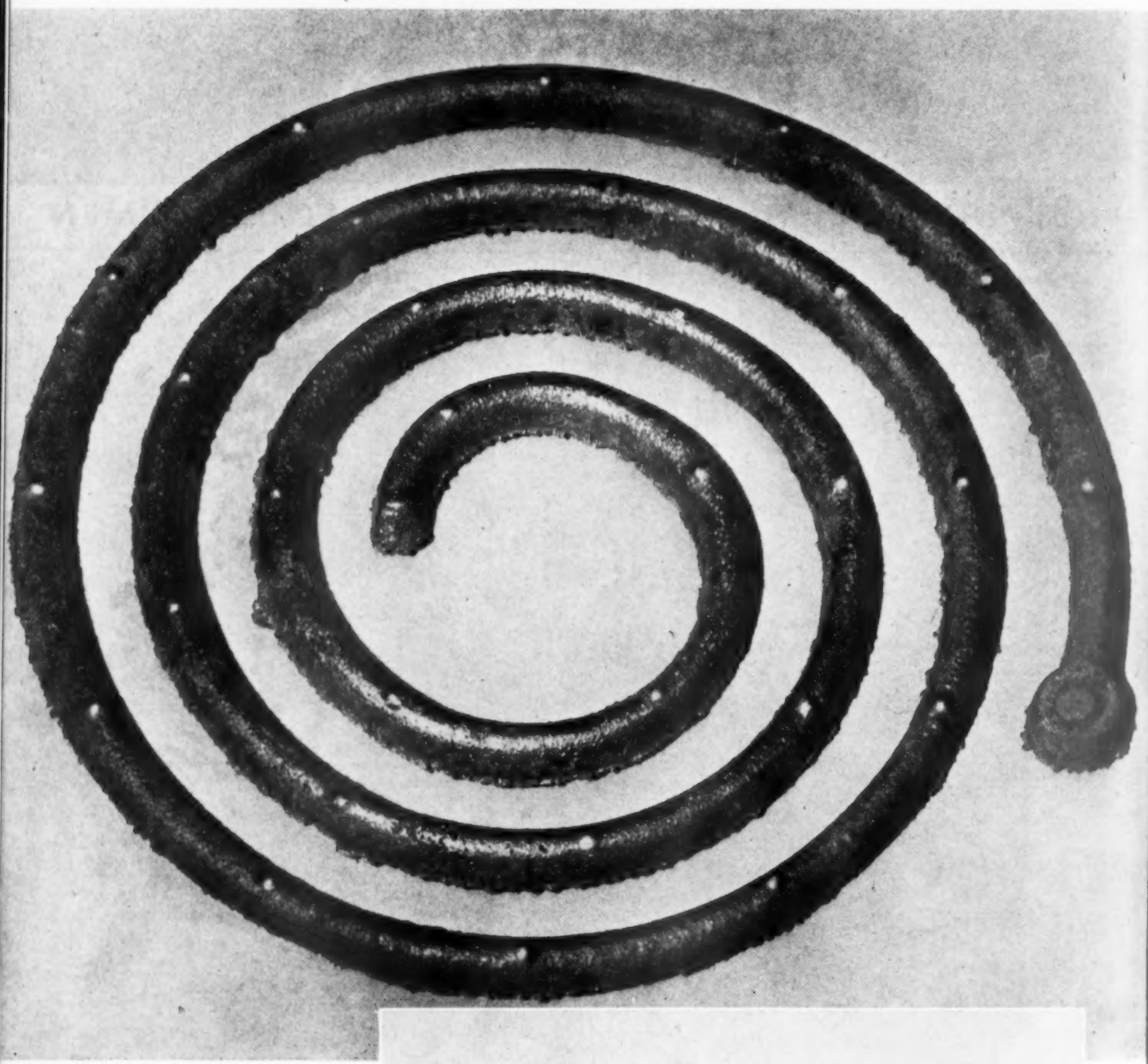
G-IRON to be EXHIBITED

Graphitized pig iron which imparts to gray iron castings an improvement in grain refinement—machineability—fluidity—shrinkage—will be introduced by the Tonawanda Iron Corporation at the Foundry Exhibit in Buffalo April 25—28.

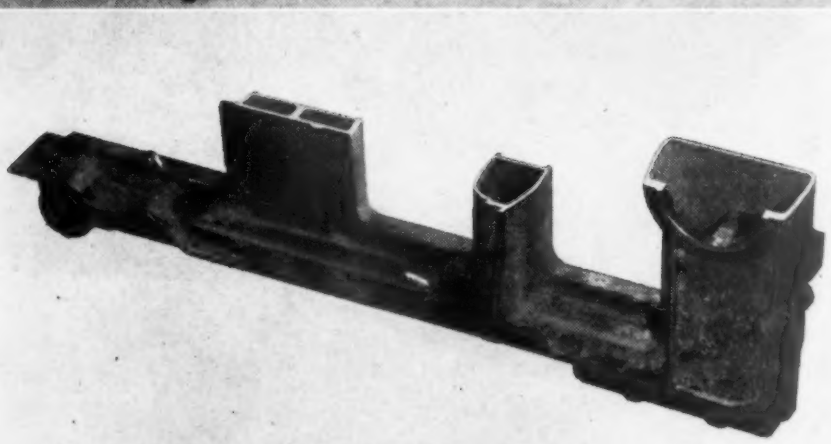
G-Iron is graphitized pig iron. These photographs show its grain structure.

Circle: photomicrograph etched—100 diam.

STANDARD TEST shows G-IRON more fluid by 30 to 35%



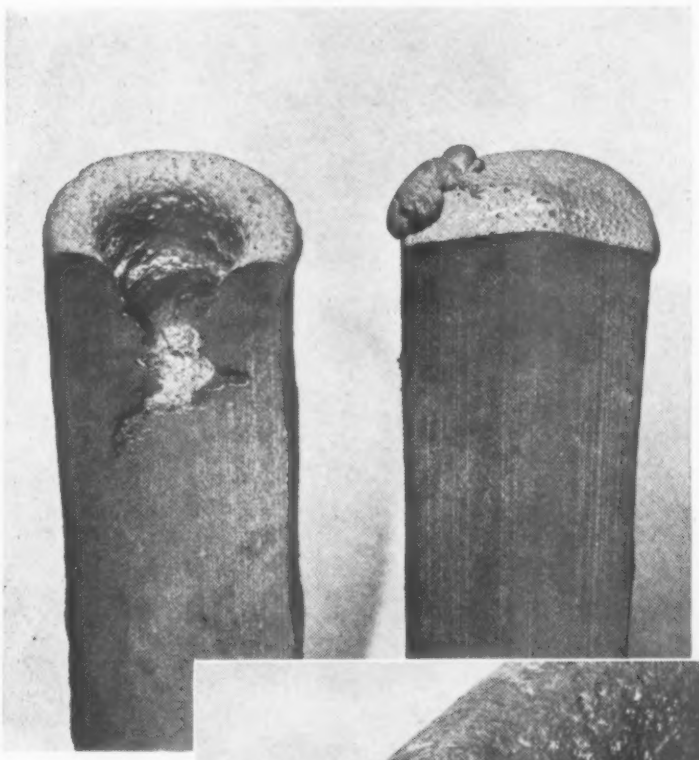
Standard fluidity test of G-Iron containing 2.08% silicon, 3.56 total carbon, measures 52 to 59 inches compared with ordinary iron which flows from 30 to 40 inches.



Greater fluidity of G-Iron and reduction in shrinkage helps solve the problem of casting thick and thin sections without the danger of cold shuts and shrink pockets. Reduces scrap losses.

PATENTED BLAST FURNACE PROCESS locks in graphitized structure of G-Iron to final casting

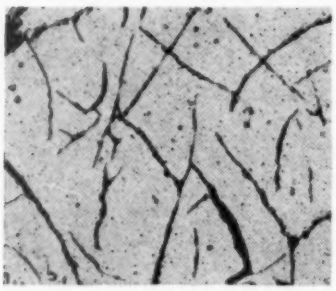
Eliminates blow holes—gives better machineability.



Here are two risers from the same casting operation. The left is ordinary iron. The right patented G-Iron. See how G-Iron fills the riser completely. Reduction in shrinkage makes G-Iron castings sound—grain refinement easier to machine. Gives tools longer life.

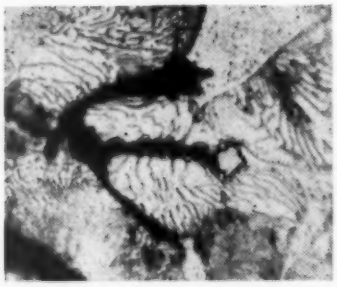
Left: Regular Iron
Right: G-Iron

PHOTOMICROGRAPHS SHOW HOW carbon in G-Iron is broken up into a finely divided state and more evenly distributed

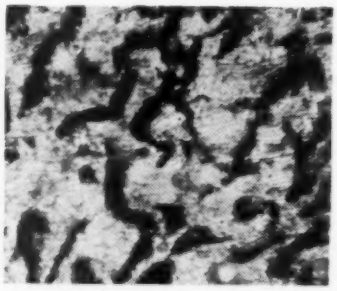


Regular Pig Iron
Unetched—100 Diam.

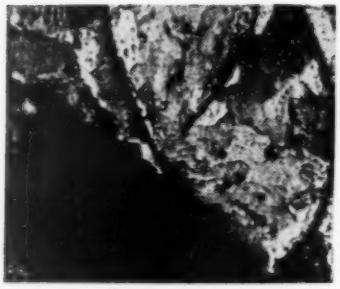
G-Iron Pig
Unetched—100 Diam.



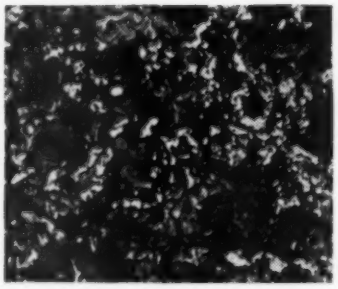
Regular Pig Iron
Etched—1000 Diam.



G-Iron Pig
Etched—1000 Diam.

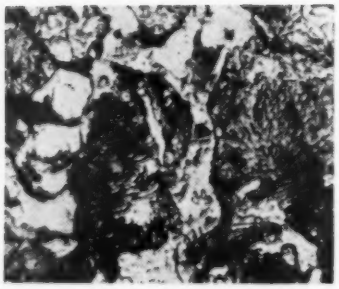


Casting
Regular Pig Iron (35%)
Etched—100 Diam.



Casting
G-Iron (35%)
Etched—100 Diam.

Casting
Regular Pig Iron (35%)
Etched—500 Diam.



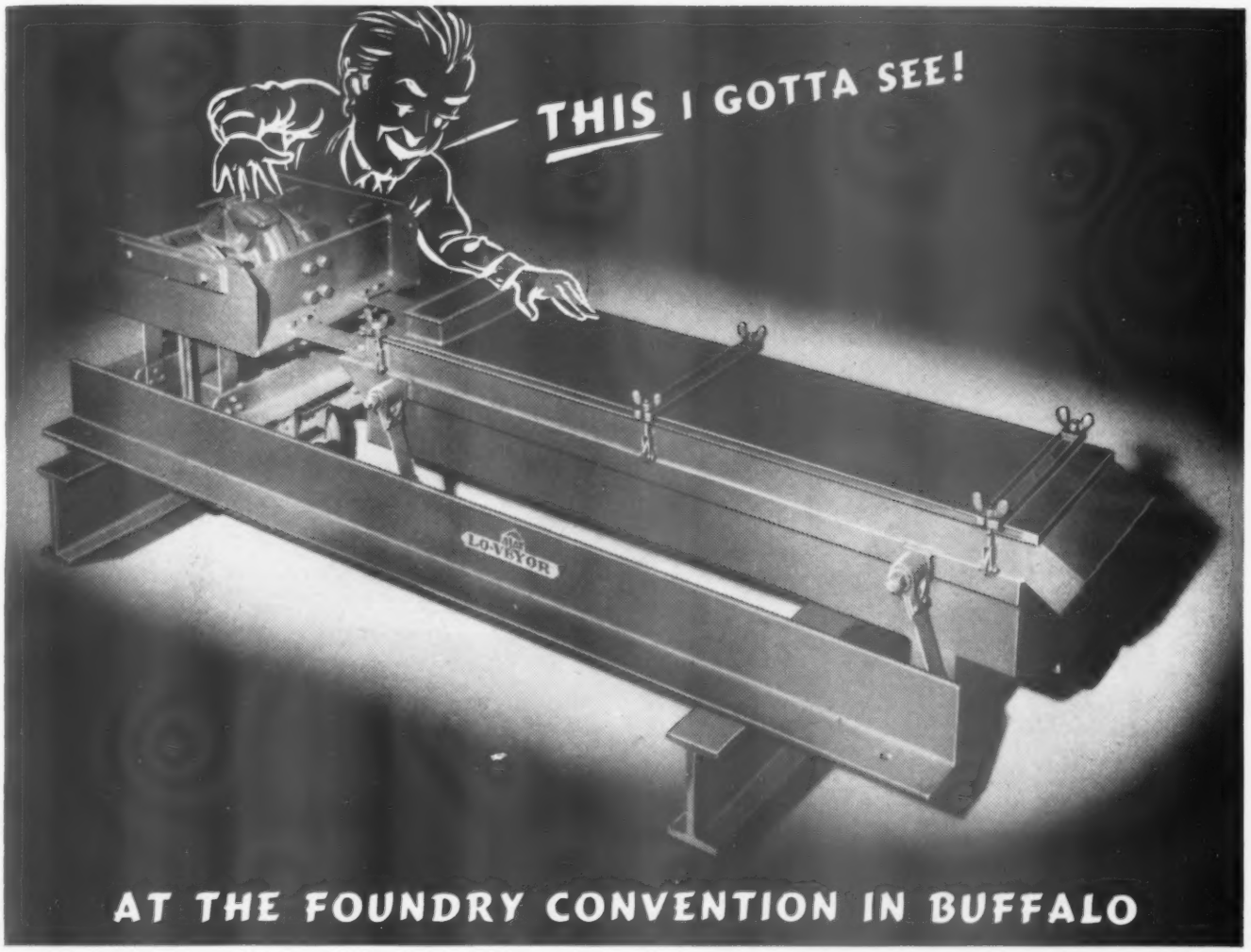
Casting
G-Iron (35%)
Etched—500 Diam.

You are cordially invited to visit our booth at The Foundry Exhibit and learn the full story of this patented* new iron which has so many outstanding improvements.

*Covered by U. S. and Canadian Patents

TONAWANDA IRON CORPORATION

NORTH TONAWANDA, N. Y.



AJAX *will present and demonstrate a* STANDARD SHOT RECLAIMING SCREEN

TURNS SCRAP INTO EXPENSIVE GRIT

● Experience in America's largest foundries has proved that this Ajax Shot Screen is the answer to grading and reclaiming shot for centrifugal and compressed air blast machines.

1. Separates shot into large and small sizes for heavy and light work.
2. Speeds up blasting of heavy work by screening out the small sizes, thus eliminating cushioning action.
3. Salvages sizes below #45 for use in blasting fine heat-treated parts.
4. Recovers high priced grit from what is ordinarily waste shot.
5. Compact, self-contained screen is easily installed. Rotating parts completely enclosed . . . long life . . . pays for itself over and over!

Be sure to see it in operation at the Foundrymen's Convention.

AJAX

INCORPORATED 1920

FLEXIBLE COUPLING COMPANY

WESTFIELD, N. Y.

A MATERIALS HANDLING METHOD THAT IS

A Real Earner

Automatic
TRADE MARK
TRANSPORTER

NO STRAINING..TUGGING..PULLING..NOR PUSHING

POSITIVE MECHANICAL BRAKE — CONTROLS IN STEERING HANDLE
FORWARD AND REVERSE SPEEDS — FRONT WHEEL POWER DRIVE
SHOCKLESS HYDRAULIC PLATFORM LIFT WITH EASY FOOT CONTROL

TOO often a large part of savings made from short cuts along the line of production are lost by inefficient materials handling methods.

To save such losses and also add to earnings, you have a dependable answer in the TRANSPORTER. This mechanized material-handling truck moves tons of materials, supplies and products quickly at low cost, to facilitate production and make possible maximum savings.

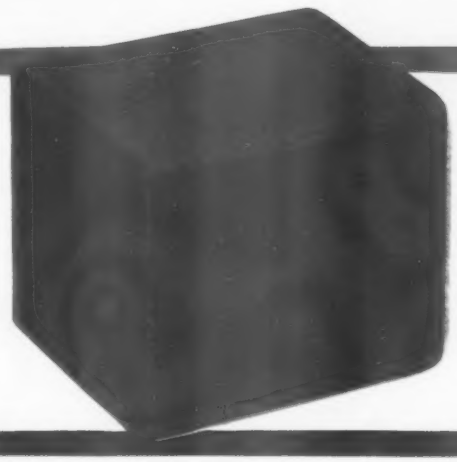
Regardless of the line of travel — whether along narrow aisles, in elevators, in congested areas — the TRANSPORTER takes its loads doing all the heavy work. The trucker simply guides the TRANSPORTER and walks along with the load.

MANUFACTURERS FOR OVER THIRTY FIVE YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.
DIV. OF THE YALE & TOWNE MFG. CO.
121 WEST 87th STREET CHICAGO 20, ILLINOIS

Foundrymen Everywhere...

HAIL NEW BRIQUETTED ALLOY ACHIEVEMENT FOR CUPOLA ADDITION



FULLY USEFUL PROTECTIVE BINDER*

The new pitch bound OFA Briquets, during the heating operation, produce a carbon binder which protects the readily oxidized ferro-alloy up to its alloying in the iron. It is then consumed as part of the charge without producing an added refractory slag burden.

*Patent Pending

COLORED FOR EASY IDENTIFICATION

Silicon Briquets (Black) containing either one or two pounds of contained silicon. Manganese (Red) in two pounds of contained manganese and Chrome (Green) in two pounds of contained chrome.

SHAPED FOR CONVENIENT STORING

For easy storage and handling, the new OFA Briquets are produced in cubical and rectangular shapes. *Immediate delivery* in tonnages to meet your requirements—your trial will prove all of the OFA Briquet advantages.

NEW . . INFORMATIVE BROCHURE NOW AVAILABLE

Send today for your copy of the interesting brochure containing complete information with actual production tests.

PHILO — DEPENDABILITY — QUALITY — SERVICE

RAINIER — DEPENDABILITY — QUALITY — SERVICE

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

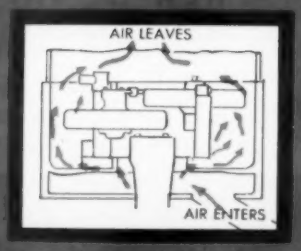
MULLED...*NOT* CRUSHED!

Compare this sand with that produced by other mullors—*see* and *feel* the difference. Note the thorough distribution and the absence of lumps. No further aeration necessary!

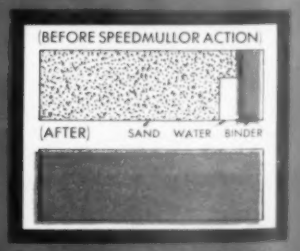
Speedmullor action mulls and aerates all the sand constantly between two pieces of live rubber. Its rubber-lined wall and rubber-tired wheels will not crush the silica grains nor permit them to slip or skid. The centrifugal force of the Speedmullor wheels exerts the correct pressure on the sand necessary to produce proper distribution of additions.

Speedmullor squeezes and kneads the sand between resilient rubber surfaces which last indefinitely because of their resistance to abrasive action.

Speedmullor disperses the sand—holds it in suspension as it kneads and agitates...separating the grains and avoiding compact masses.



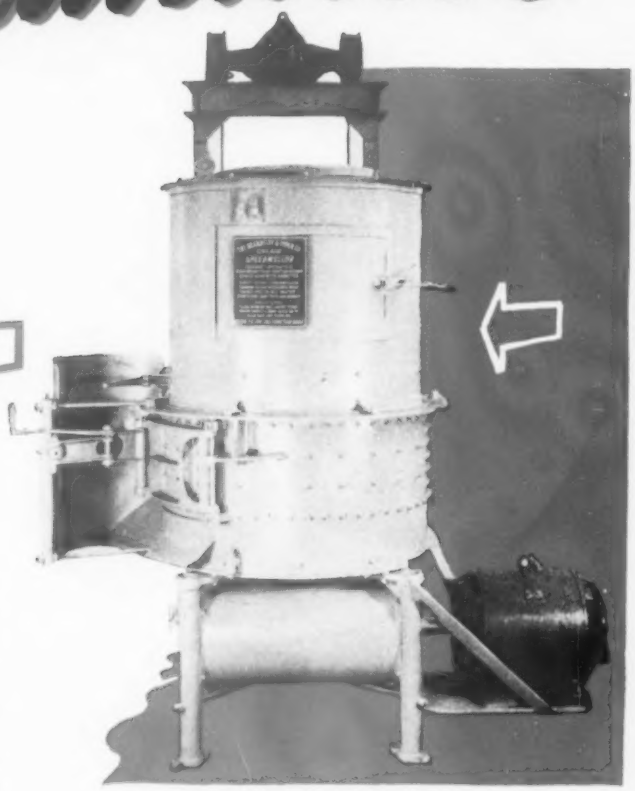
Air entering Speedmullor at bottom is forced through suspended sand, quickly cooling it to within a few degrees of room temperature.



Speedmullor causes rapid and continuous agitation of sand, binders and moisture. Constantly changing position, each sand grain becomes uniformly coated.

The Beardsley & Piper Company are manufacturers of Speedslingers, Speedmullors, Sandslingers, Screenarators, Shakeouts, Sand Conditioning Equipment, Mold Handling Equipment, Gyratory Screens.

The Speedmullor



Speedmullors can be furnished with or without Skip Hoist; Air Cooling; Fines Removal. Sold in a number of sizes and styles to meet your individual foundry needs.

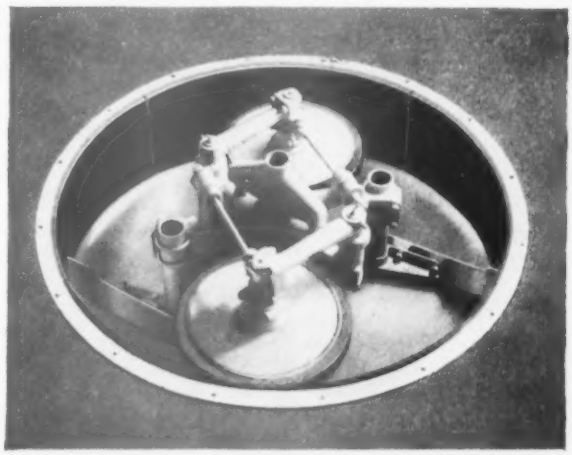
Mull your facing, backing and core sand with the Speedmullor! Faster and more economical than any other method, the Speedmullor assures better surface finish of castings with resulting reduction in cleaning cost.

The Speedmullor is extremely economical in operation and maintenance. Because of more thorough and uniform mulling it develops the greatest plastic strength and workability from the least amount of binder. Speedmullors frequently pay for themselves *three times over in one year* on core oil savings alone. The rubber-lined walls and rubber-tired wheels last 50 times longer than steel!

Write today for complete information on the Speedmullor!

Get this Interesting Monthly Foundrymen's Magazine . . . . . Free!

BETTER METHODS is of interest to all foundrymen. It contains informative articles of both a specialized and general nature. Let us put you on the BETTER METHODS mailing list. No obligation...just send in your company name plus your name and title.



Plows constantly toss, tumble and aerate. Wheels squeeze and knead the sand while it is in suspension on the mullor wall.

Again Beardsley & Piper have some startling, revolutionary equipment ideas — all worked out, too — ready for demonstration at the Third War Production Foundry Congress, Buffalo, N. Y., April 25th to 28th. Be sure to see them!

THE BEARDSLEY & PIPER COMPANY

B&P

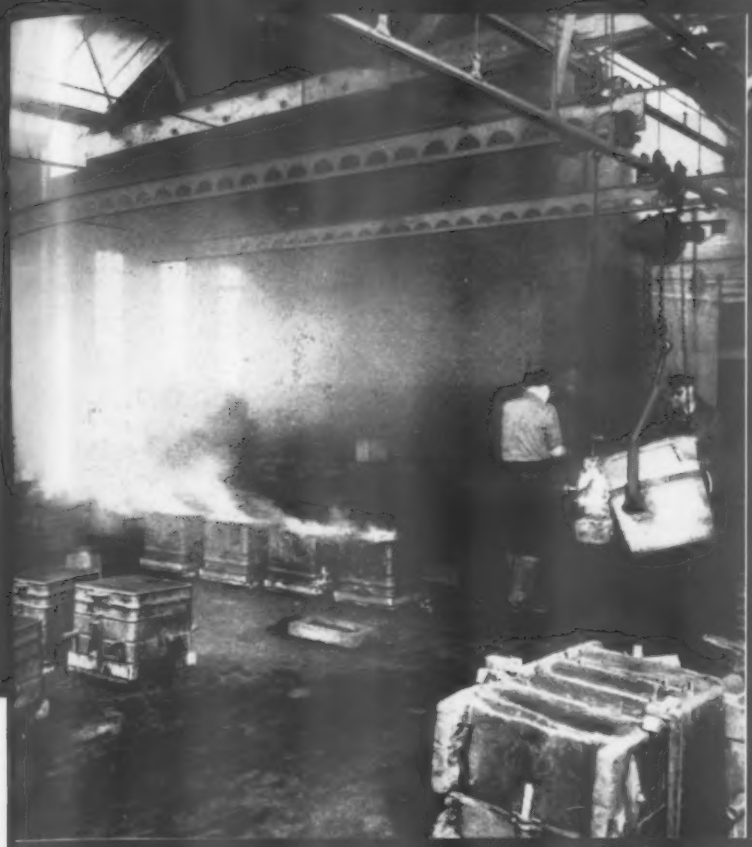
"BETTER METHODS"

THE BEARDSLEY & PIPER COMPANY

2541 North Keeler Avenue Chicago 39, Illinois

...PRODUCTION

A VITAL WORD SYNONYMOUS WITH CLEVELAND TRAMRAIL

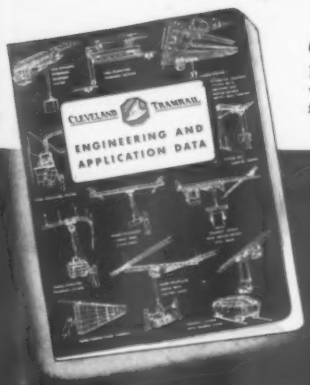


CLEVELAND TRAMRAIL SPEEDS FOUNDRY PRODUCTION

Today one of the most vital words in the dictionary is PRODUCTION. Every device conceivable is being considered or adopted that will aid the output of a plant. This holds true in foundries. Castings of every kind are needed badly in the war program.

When one considers that from 25 to 100 tons of materials (such as sand, flasks, molds, cores, pig iron, scrap, molten iron, rough castings) are handled to produce one ton of finished castings, the importance of the labor and time required for handling is more fully appreciated. Indeed, one of the most important ways of stepping up production in a foundry is through use of equipment that will facilitate handling.

In hundreds of foundries Cleveland Tramrail has eliminated a vast amount of unnecessary rehandling and greatly reduced manual drudgery. Because of this modern overhead materials handling equipment many more tons of castings are being produced with the same facilities and labor.



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BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

"CERTIFIED" STEEL ABRASIVES

RIGHT ON THE NOSE!

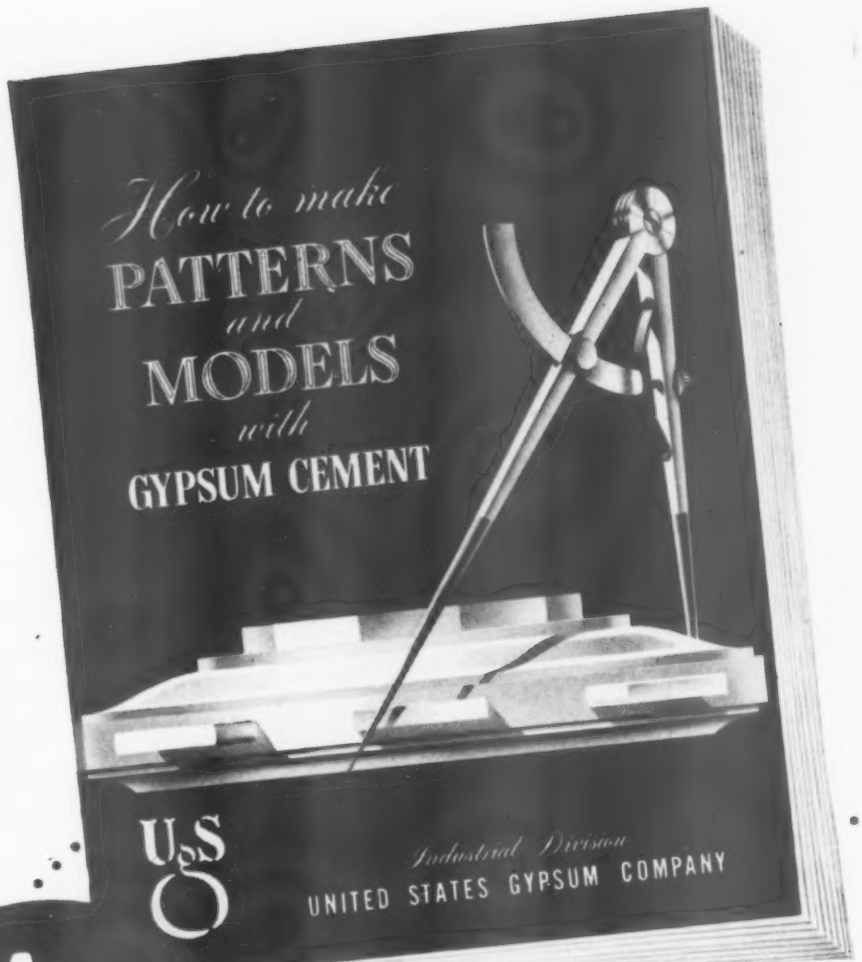
● "CERTIFIED" STEEL ABRASIVES—GRIT AND SHOT—are in this war for keeps—hitting their targets again and again—*right on the nose!*

These well known abrasives have proven to industry that they can take *impact*—with minimum breaking up—that they can absorb *shock*—with little cracking or crumbling. This guarantees longer life—lower cost—greater usefulness—and less worry for those who must get blast cleaning jobs done efficiently—quickly.

Only the electric furnace—under our unmatched conditions—can produce abrasive like "CERTIFIED." But your plant can use this economical steel shot and grit—and have its superior qualities working in *your* interest—simply by specifying on every order—buy "CERTIFIED"!

PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PENNA.

STEEL SHOT AND GRIT CO.
BOSTON MASS.



A NEW MANUAL

52 PAGES

THE FIRST MANUAL ever published showing basic methods for making better patterns .. faster . . . and, at lower cost. Step-by-step pictures illustrate methods in detail. Procedures described are being used in America's leading war plants, where accuracy and speed are imperative. This book has been prepared to help any pattern-maker master the technique and to help plant owners put modern pattern-making methods into operation. Just off the press. Reserve your copy today. Use coupon below, or write on company stationery.

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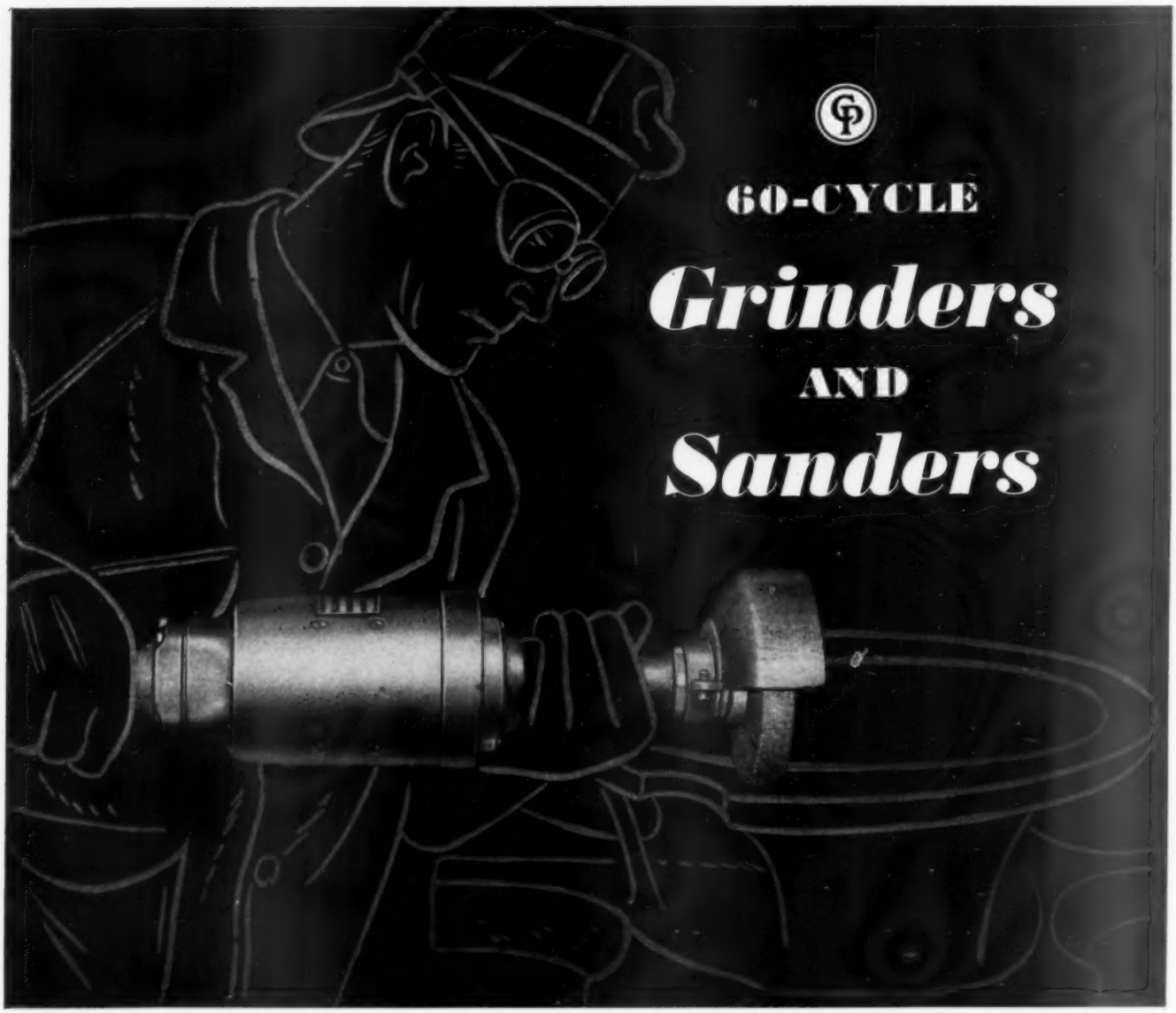

. . . maintain speed under load

IDEAL for plants whose operations do not warrant the installation of high frequency tools — or plants that have such tools but lack high frequency power lines at points where additional tools could be advantageously used, CP-460 Grinders and Sanders afford fast, uniform grinding and sanding. They have a powerful, efficient, lightweight induction motor of the same type as the well-known CP Hicycle Grinder but operate on 60-cycle, 3-phase, 220-volt A.C. This motor insures high sustained speed under load. Absence of commutators, brushes, brush holders, armatures, etc., assure lower maintenance costs. Write for complete details on CP-460 Grinders, Sanders.

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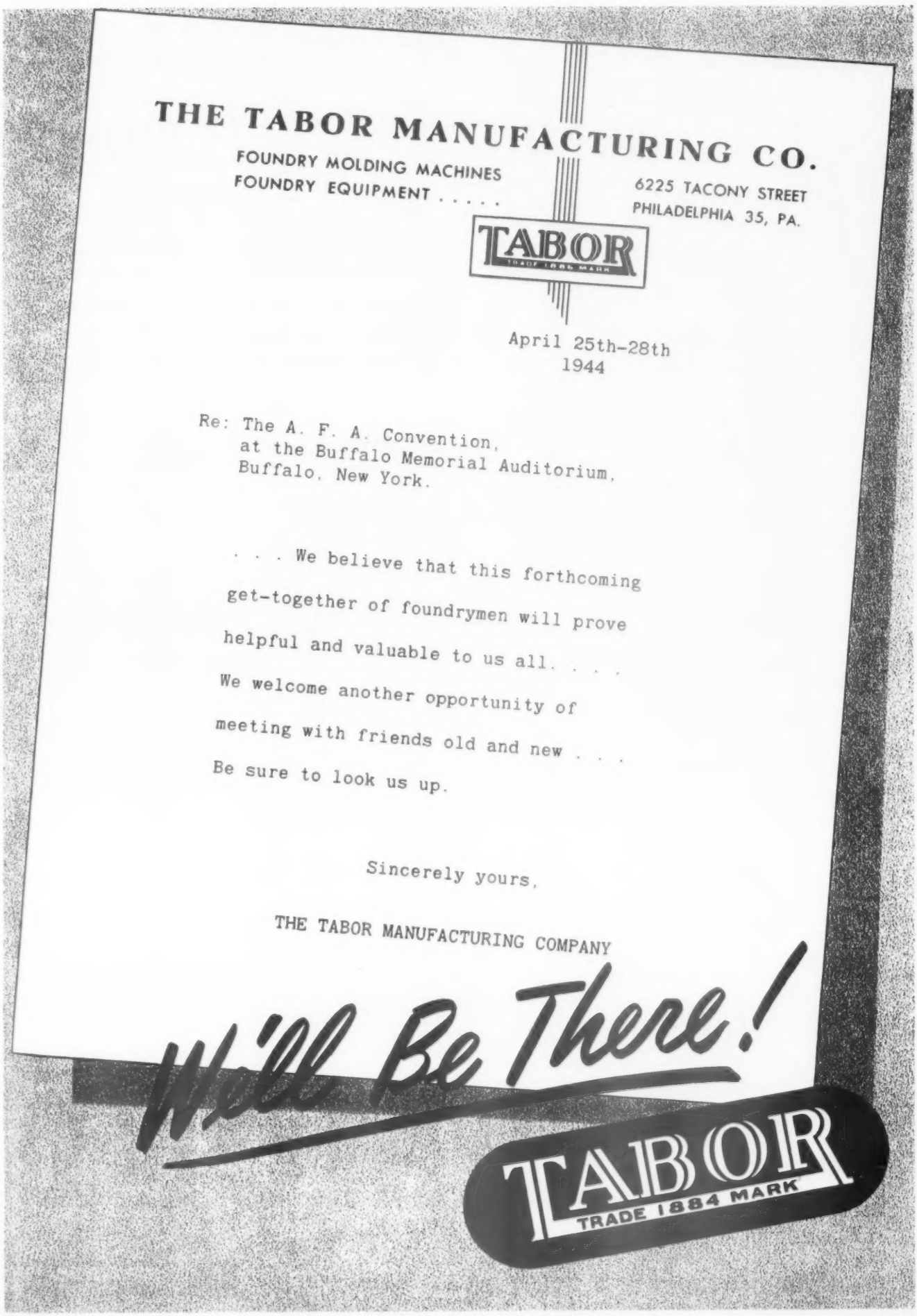
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TRADE 1884 MARK
April 25th-28th
1944
Re: The A. F. A. Convention,
at the Buffalo Memorial Auditorium,
Buffalo, New York.
. . . We believe that this forthcoming
get-together of foundrymen will prove
helpful and valuable to us all. . . .
We welcome another opportunity of
meeting with friends old and new . . .
Be sure to look us up.
Sincerely yours,
THE TABOR MANUFACTURING COMPANY
Will Be There!
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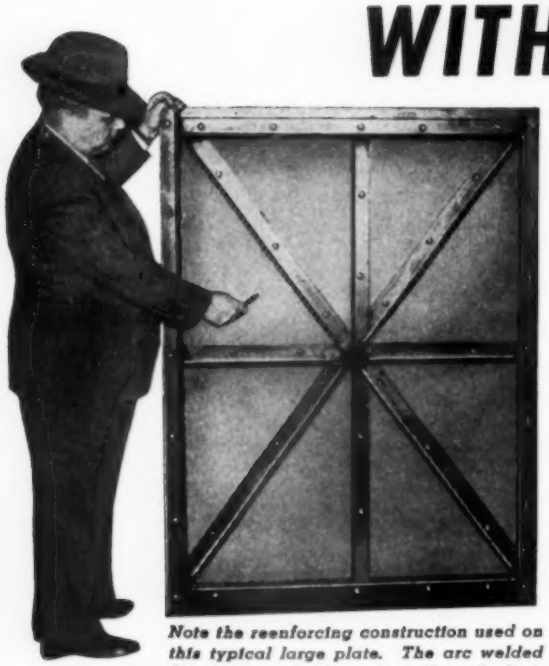
CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!



Note the reenforcing construction used on this typical large plate. The arc welded frame gives rigidity, strength and elimi-nates deflection.

IT IS BEING DONE ON DIAMOND REENFORCED STEEL CORE PLATES

These special core plates are designed to carry large cores up to 1200 lbs., cores of any size, without deflection or warping.

You may obtain Diamond Core Plates to suit your own special requirements. They are furnished with or without perforations and in all smaller, standard sizes—plain or reenforced as indicated by your needs.

Send us detailed information on your core baking problem and we'll be glad to design a plate to handle the job. Weight of core and dimensions, in particular.

DIAMOND

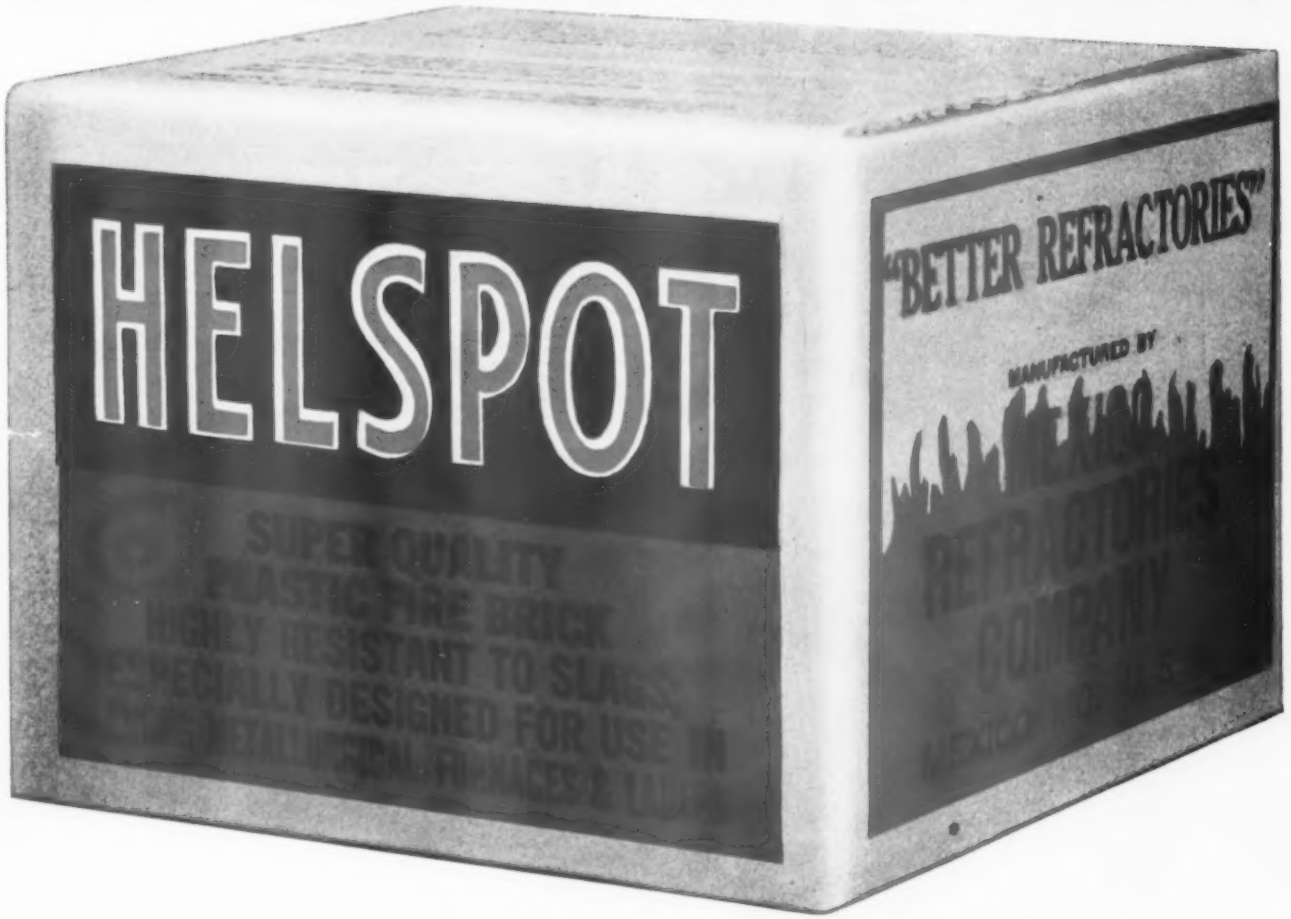
CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of **CORE PLATES, JACKETS, BANDS, FLASKS** *since 1889*

HEL'SPOT

SLAG RESISTANT MONOLITHIC LADLE LINING



A NEW DEVELOPMENT

HEL-SPOT or HELS-POT—whichever you prefer—is an improved ladle lining refractory.

HELSPOT is the direct result of a demand from Foundrymen and Steel-makers for a ladle lining refractory with high resistance to spalling, abrasion and slags.

HELSPOT is a Missouri super quality refractory scientifically combined with a special Graphite, chemically sealed into the mix.

The use of HELSPOT results in cleaner ladles; metal flows freely without slagging or sticking; troublesome skulls and bridging are eliminated—therefore, more perfect castings, fewer rejections, longer ladle service life.

HELSPOT is shipped in 100-lb. water-proof cartons, sliced in 6 convenient slices; also 500-lb. steel drums. Its putty-like consistency makes HELSPOT easy to install.

WRITE FOR MORE DETAILED INFORMATION

MEXICO REFRACTORIES COMPANY

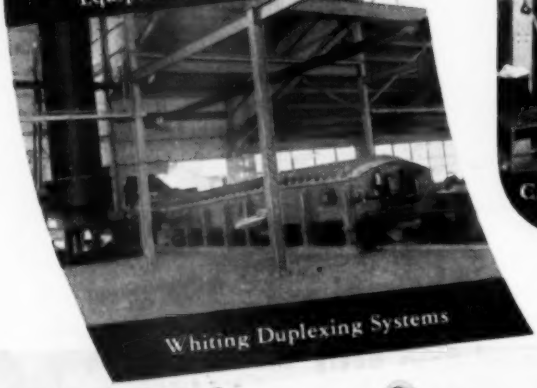
MEXICO, MISSOURI, U. S. A.

EXPERIENCE

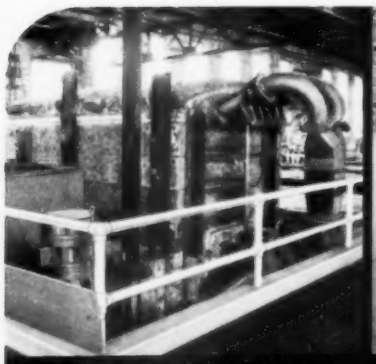
. . . the Intangible PLUS VALUES in WHITING FOUNDRY EQUIPMENT

Whiting Cupolas—used in producing over 90% of the grey iron castings made in the United States

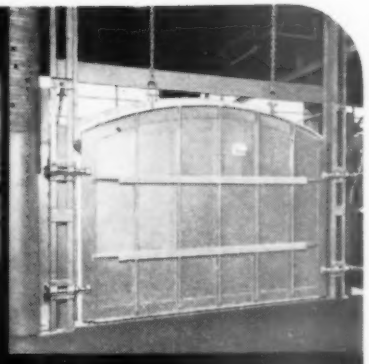
Cranes and Mechanical Charging Equipment save manpower



Whiting Duplexing Systems



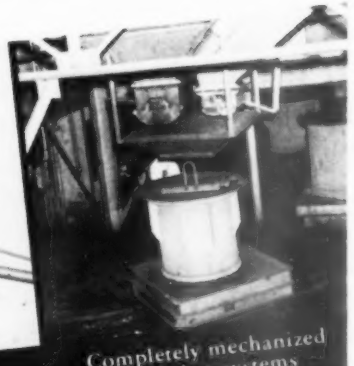
Air Furnace—fired with pulverized coal



Annealing Ovens

Cradle Furnace—pulverized coal fired

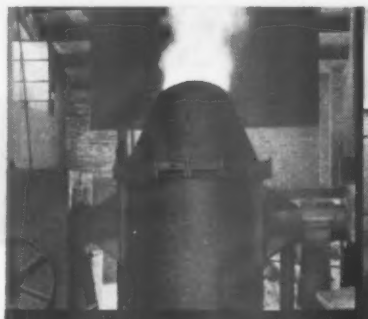
Whiting Coal Pulverizer



Completely mechanized charging systems

Whiting has a complete line of ladles for every foundry purpose

RESEARCH · ENGINEERING



Whiting Side-Blow Converter

Whiting Hydro-Arc Electric Furnace

Whiting Skip Hoists

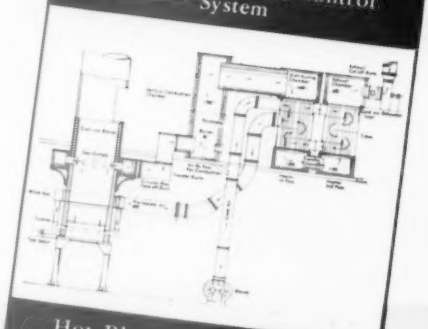
Hydro-Clone Wet Dust Suppression Equipment

Whiting has been intimately associated with the metal trades for *sixty years* . . . not only as a supplier of equipment, but in pioneering new methods and practices to increase the efficiency of foundry operations.

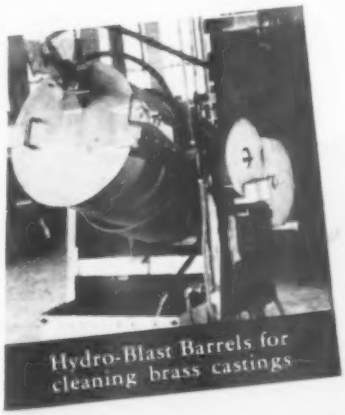
Through continuous research, practical experience, intimate knowledge of foundry operations, and advanced engineering design, Whiting has consistently provided the best in foundry equipment. Adapting this equipment to the particular needs of each job and following through with service men, assures complete satisfaction. As a customer recently wrote us "You can always depend on Whiting."

Consult us on your equipment problems. Whiting Corporation, 15607 Lathrop Ave., Harvey, Illinois.

Kathabar Moisture Control System



Hot Blast System supplies pre-heated air to cupola



Hydro-Blast Barrels for cleaning brass castings

ARMY E NAVY

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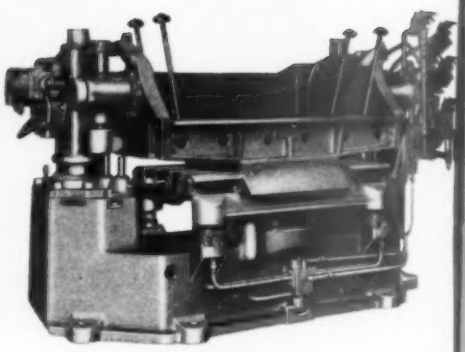
SIXTY YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

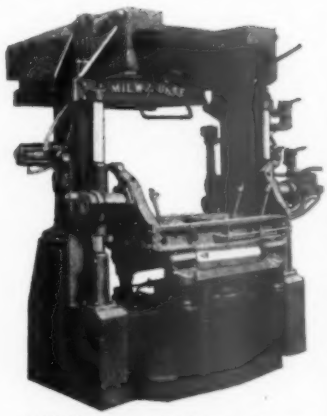
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, and Washington, D.C. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario.

Your Move TO



Jolt Rollover Draw
Available in 6 sizes.

Jolt Squeezer
—Stationary Type



Jolt Squeeze Rollover Draw

NOW—Jump at the opportunity to modernize your molding methods with MILWAUKEE MOLDERS! They'll help boost your war production to peak levels, at the same time maintaining high standards of quality.

Frankly, you would condemn the Armed Forces for using old Civil War artillery in the present crisis, wouldn't you? Then why continue to use antiquated machines in your foundry . . . equipment which may have served adequately for normal peacetime operations, but which is woefully inadequate for present stepped-up war production, as well as post-war schedules?

In the complete MILWAUKEE line, you'll find a modern, high-speed model for every molding requirement...and every machine is designed and built by practical, seasoned foundrymen. So play safe! Look to MILWAUKEE for dependable, high-speed machines.

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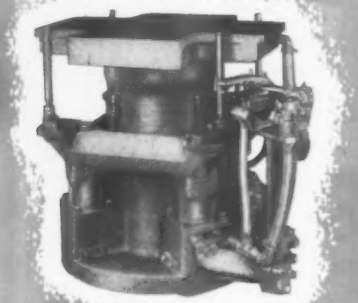
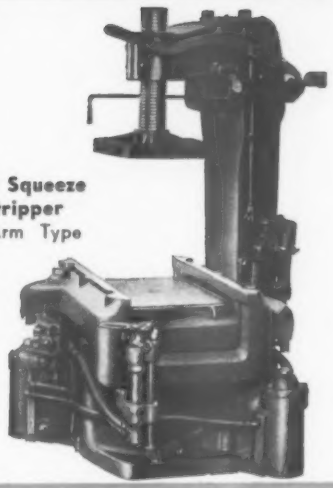


Jolt Pin Lifter
Available in 6 sizes.

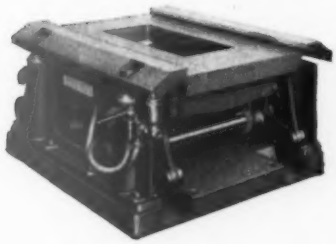


Jolt Squeeze Stripper
—Arm Type

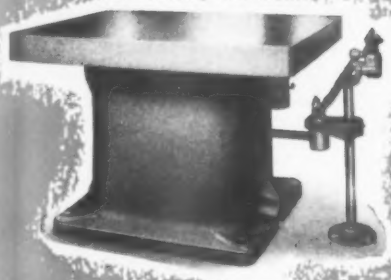
Jolt Squeeze Stripper
—Car Type

Jolt Squeezer
—Portable Type

Jolt Squeeze Pin Stripper

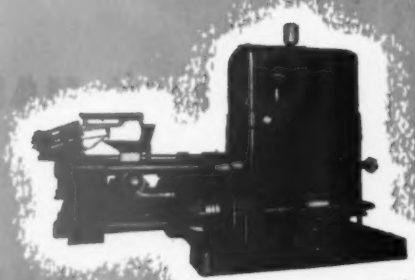


Power Rail Push-Off



Plain Jolt
Made in All Sizes

Core Grinder



Hydraulic Briquetting Press

Call in a Milwaukee Foundry Equipment Engineer. His broad experience enables him to study your molding and core-making problems intelligently, and arrive at a solution that is both practical and economical.

Foundry Equipment Co.

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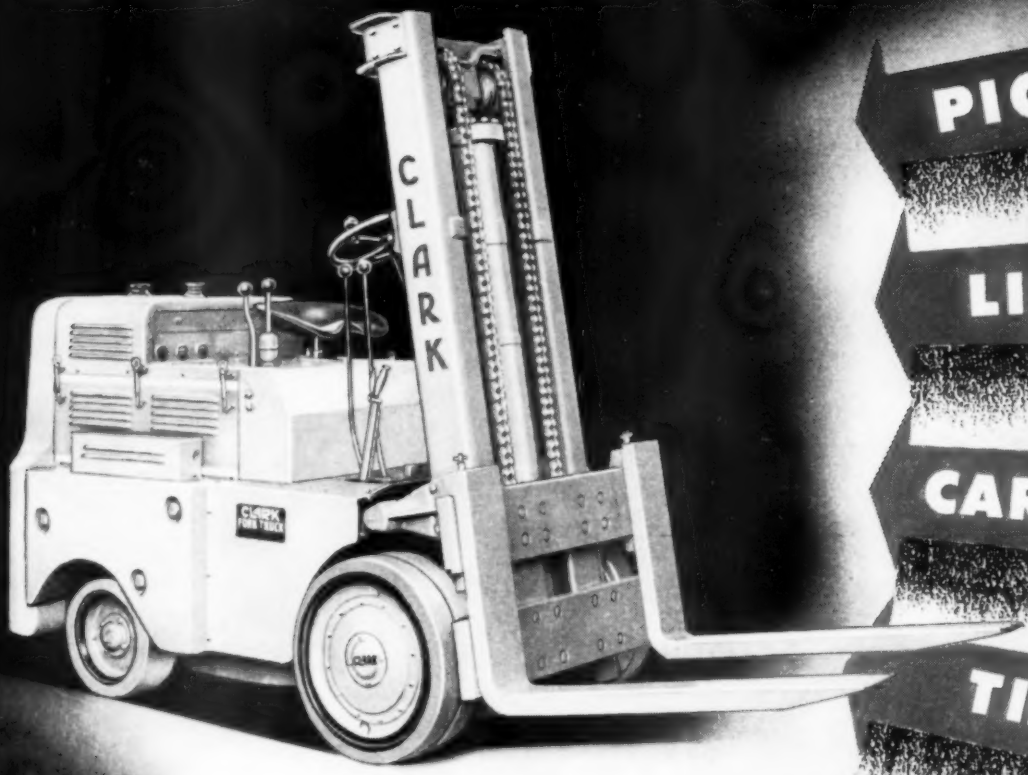
CLARK FORK TRUCKS



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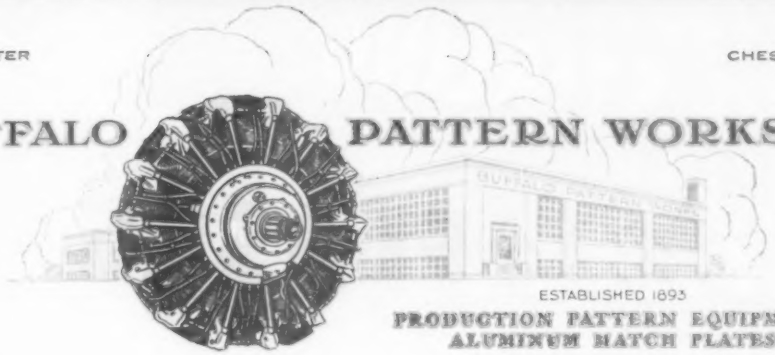

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ALUMINUM MATCH PLATES

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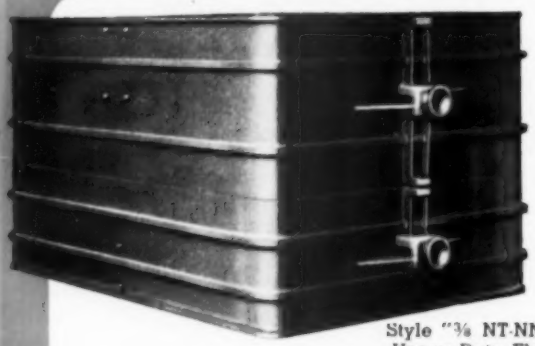
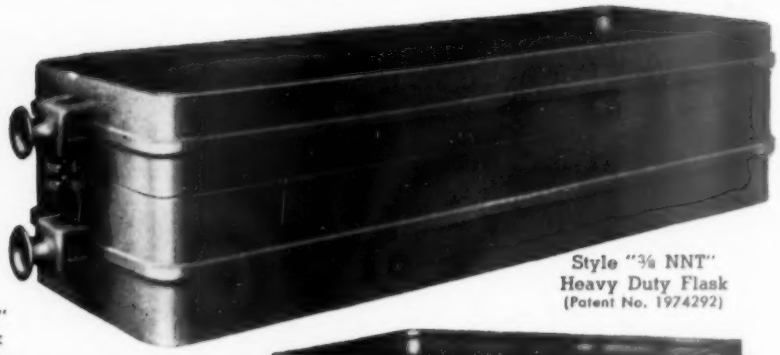
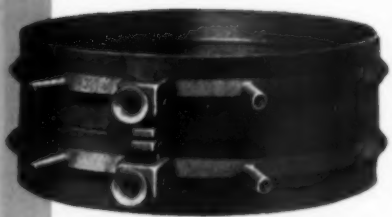


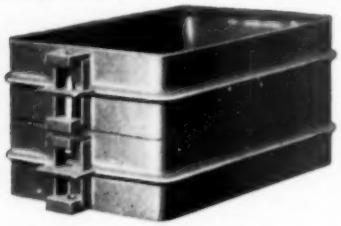
Style "¾ NT-NNT" Heavy Duty Flask (Patent No. 1974292)



Style "¾ NNT" Heavy Duty Flask (Patent No. 1974292)



Style "BLT" with trunnions.



Style "A" with double pin lugs.

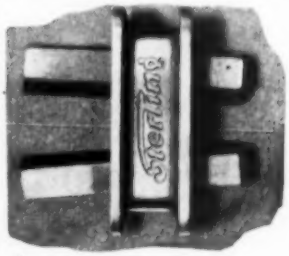
Style "¾ NT" with dual center bars.

Style "AA" with single pin lugs.

Style "LL" with angle re-inforcement.

STERLING FOUNDRY ACCESSORIES

(1) Sterling Flask Clamp. **(2)** Standard Hardened Steel Bushing. **(3)** Stub Pin in Drag Lug — Bushing in Cope Lug. **(4)** Standard Hardwood Foundry Wedges. **(5)** Standard Type "S" Flask Pin. Other Sterling foundry equipment includes: Flask Bars — Core Plates — Bottom Boards — Upsets — Foundry Wheelbarrows, Carts and Trucks — Casting Carts — Charging Carts—Slag Buggies, etc. Write for catalog.



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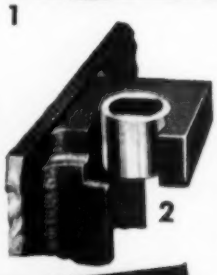

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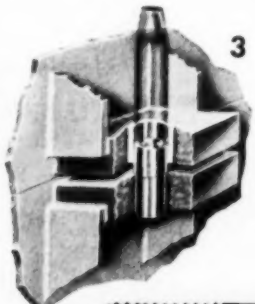

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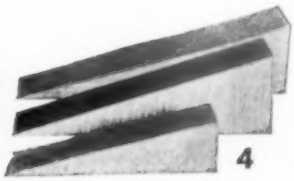

4

5

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The 12"-38" Adams Jolt Squeezer, Portable Type

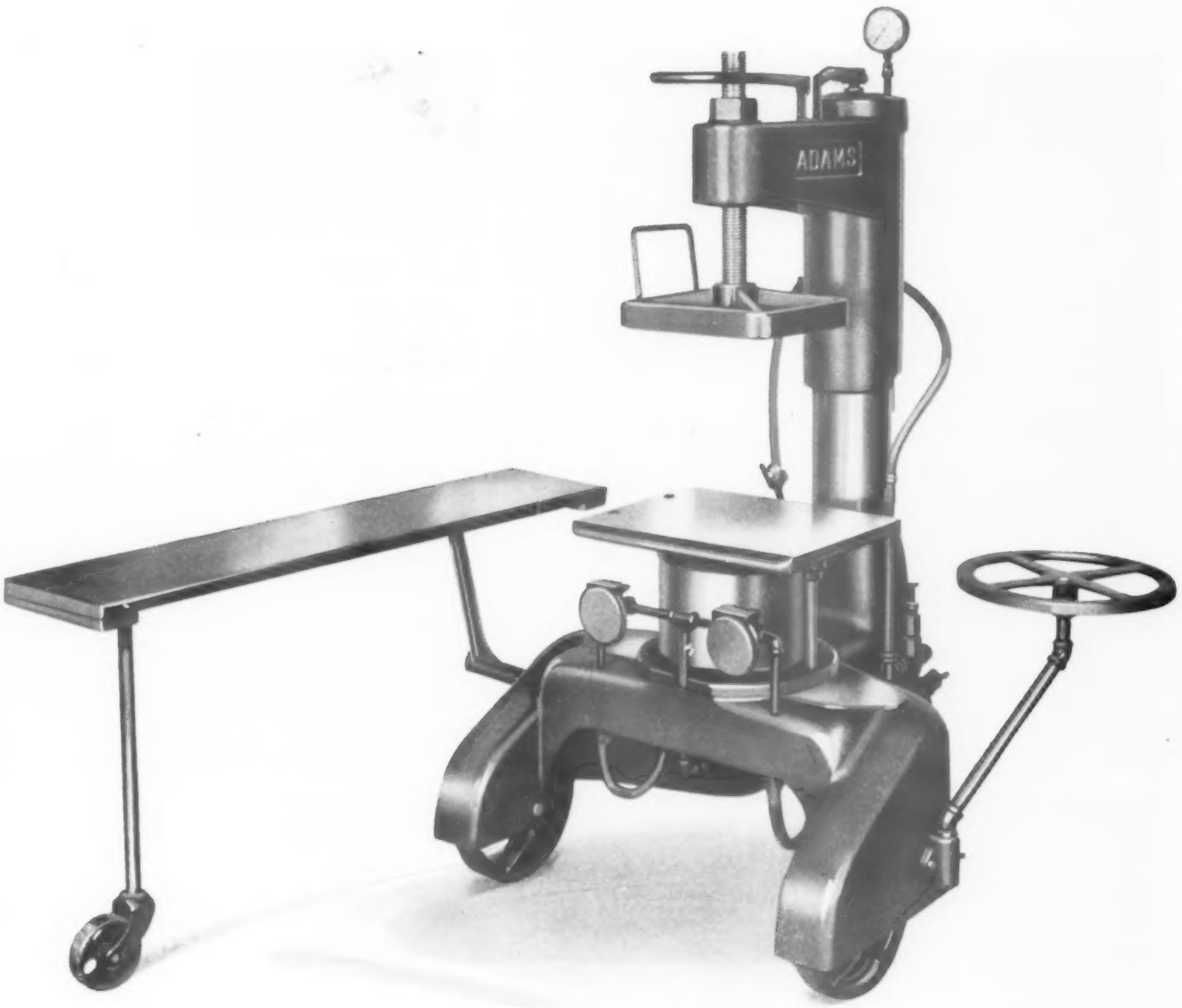
Make Your Selection From This List-A

SIDE ROD TYPE PORTABLE OR STATIONARY	Squeeze Piston diameter	Jolt Piston diameter	Clearance between Side Rods	Pattern Draw, Adjustable
10"-32" Jolt Squeezer	10"	4"	32"	
12"-38" Jolt Squeezer	12"	5"	38"	
16"-42" Jolt Squeezer	16"	6"	42"	
10"-32" Universal Jolt Squeezer	10"	4"	32"	3" to 6"
12"-38" Universal Jolt Squeezer	12"	5"	38"	3" to 6"

Also Adams Hand Squeezers —30", 34" or 38" between side rods—Portable or Stationary.

THE ADAMS COMPA

MOLDING MACHINES · FLASK



The 10" Post Type Universal Squeezer, Portable Type

Adams Molding Machines

POST TYPE
PORTABLE OR STATIONARY

	Squeeze Piston diameter	Jolt Piston diameter	Pattern Draw, Adjustable
10" Post Type Jolt Squeezer	10"	4"	
12" Post Type Jolt Squeezer	12"	5"	
10" Post Type Universal Jolt Squeezer	10"	4"	3" to 6"
12" Post Type Universal Jolt Squeezer	12"	5"	3" to 6"

Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.

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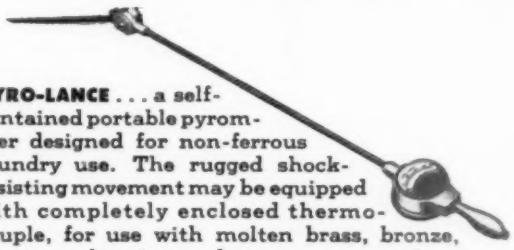
ALNOR VELOMETER . . . the instantaneous direct reading air velocity meter. Operation of exhaust systems, dryers, blowers, and similar equipment can be checked by anyone. No calculations, no timing; extension jets permit accurate readings in inaccessible locations.



PYRO-LANCE . . . a self-contained portable pyrometer designed for non-ferrous foundry use. The rugged shock-resisting movement may be equipped with completely enclosed thermo-couple, for use with molten brass, bronze, copper, aluminum bronze, magnesium alloys and similar metals at temperatures up to 2250 deg. F. Pyro-Lance with bare wire thermo-couple is suited for aluminum, tin, babbit and other low temperature metals in crucibles or ladles.

Alnor Temperature Measuring Instruments... built for foundry service

Where performance really counts—in the severe operating conditions that are usual in foundry service—Alnor Instruments have proved their value by years of service. They are providing the reliable temperature measurements so important to low-cost casting production. For dependable day-after-day service choose from the complete Alnor line.

Bulletins describing Alnor Pyro-Lance, Pyrocon, Pyrometers, and the Velometer will be sent upon request.

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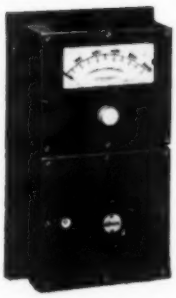

PYROMETERS . . . designed for heavy duty industrial uses. Ideally suited for use with industrial furnaces, heat treating, molding and similar foundry equipment. Made in a wide range of types, single and multi-point, furnished with thermo-couples to suit individual needs.

PYROCON . . . the contact pyrometer for measuring surface temperature is particularly suited to heat treating uses. Made with rigid or flexible arm and choice of thermo-couples. Several standard ranges, 0-400 deg. F. to 0-1200 deg. F.

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MANY new time and money-saving techniques in molding and core-making have been developed through the use of Juniata Bank Sands.

At our Buffalo Exhibit you'll see castings of outstanding quality, free from defects and metal penetration — finishes attributable to the uniform fine texture and high refractoriness of JUNIATA, and in part to the molding processes employed. Cores of high green strength with fine, sharp profiles and facings bonded with clay or bentonite will be shown and the methods of blending explained.

You are cordially invited to get the facts from our staff at Booth No. 375.

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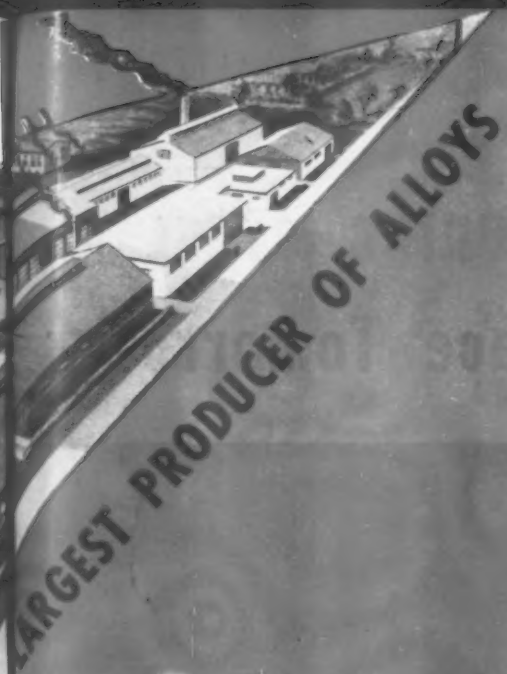
Yes, we're dusting off the welcome mat and hanging out the latch-string for you foundrymen who will make Buffalo the capitol of the foundry world from April 25-28.

Many members of our staff will be in the booth to discuss with you the latest things in alloys and metallurgical procedure. If you have a problem discuss it with us. We can probably help you solve it as we have thousands of others.



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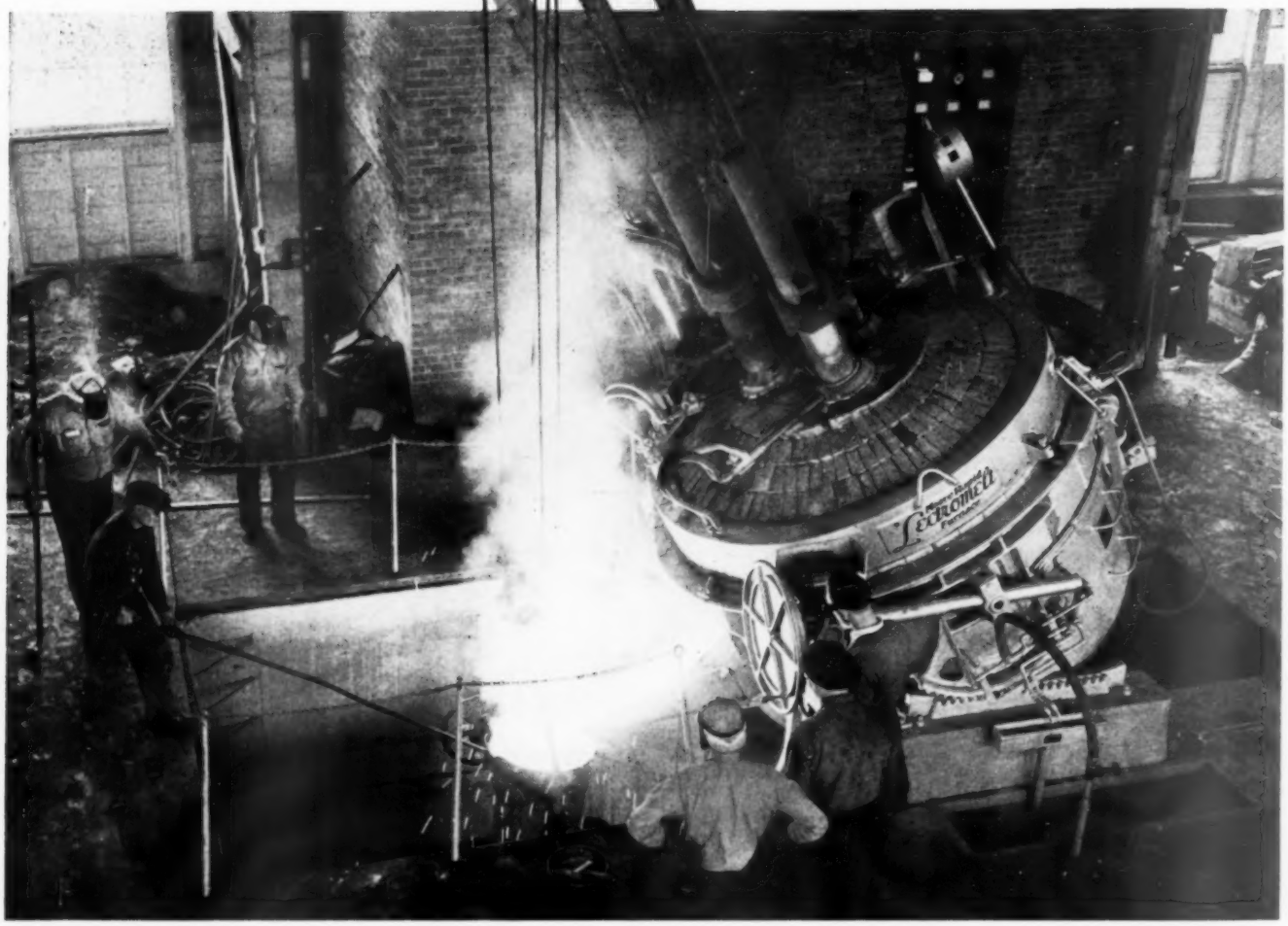
Lectromelts ARE POURING STEEL

For War Today . . . For Peace Tomorrow



The outstanding performance and reliability of Moore Rapid Lectromelt Furnaces are assuring the fulfillment of our vital war requirements. These furnaces are producing increasing tonnages of carbon and alloy steel through their ease and speed of operation. Lectromelt's simplicity of design and rugged construction afford long, dependable service with minimum maintenance.

The entire range of furnaces, from 100 tons capacity to 250 pounds, is described and illustrated in the new Lectromelt catalog. Write for your copy.

Pittsburgh Lectromelt Furnace Corporation
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TO CONNECT, place ends together, push and twist — they're locked.

EXCLUSIVE DESIGN ASSURES POSITIVE-LOCK CONNECTION

Every month more and more shops are turning to Thor "Perfect" Air hose Couplings as tests demonstrate their *greater safety.*

The ingenious, simple design of Thor Hose Couplings provides a positive, unbreakable connection . . . yet one that can be locked and unlocked in a jiffy.

Thor "Perfect" Hose Couplings can save *you* time and trouble. Ask for a demonstration in your own shop . . . soon.

Stocked and sold by leading mill, marine and foundry supply distributors everywhere.

HOLY SMOKES!
TAKES A YOUNG ARMY TO YANK YOUR COUPLINGS APART. WITH A THOR COUPLING, A QUICK, STRAIGHT PULL ON SLIDING SLEEVES AND THEY DISCONNECT IN A FLASH!

ALL THESE OUTSTANDING ADVANTAGES!

Positively locked connection that won't break or come apart.

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We'll Ship You Better Core Production IN A SAFCO DRUM!

YOU'LL GET IMPROVED CORE OIL PERFORMANCE...OR GET YOUR MONEY BACK!

Stock Cores Kept for Year Losses Minimized

In the foundry of an eastern manufacturer, a number of specialized core oils were tested for general foundry production of both gray and alloy iron castings. Tests of competitive oils (including raw linseed) indicated that SAFCO #412 Core Oil had proved its superiority on several major points.

Results showed that SAFCO #412 had reduced core losses to the point of being negligible; that cores made with #412 had sharper edges and harder surfaces. Stock cores, often kept in the stock room for over a year, retained both their strength and hardness.

Lower Cleaning Costs Improved Collapsibility

Another eastern foundry, casting bronze valves, consulted a Swan-Finch Service Engineer on methods of improving core production. The raw linseed oil they were using gave cores of sufficient strength, but had failed to meet other requirements. SAFCO RP 2-17 was suggested as being best suited to their plant conditions.

Mixed in the same sand-to-oil ratio as linseed, SAFCO RP 2-17 produced cores of equal strength at a considerable saving in core oil cost. Better collapsibility with RP 2-17 lowered cleaning costs as well, and core makers reported that cores made with this SAFCO oil worked cleaner in the core boxes.

If you have a difficult core job facing you...if you have *any* core room condition which threatens to increase your casting costs...try SAFCO Core Oils and Binders, at *our* risk! Records of actual foundry performance prove SAFCO's ability to measure up to unusual requirements—to correct faulty core oil performance—and to make good core production *better*. These records of SAFCO performance in other plants, however, merely *indicate* what it can do for you. Only a test in *your* foundry can show you *conclusive* proof of SAFCO superiority.

We invite you to test SAFCO Core Oils, therefore, on the basis of actual results in your own core room. Merely ask for a Swan-Finch Service Engineer to recommend the proper SAFCO Core Oil for your particular use. Test it—under average plant conditions—check the results for yourself. *If you don't get better all around core oil performance with SAFCO Oils, we'll cancel the invoice for your test drum!*

Swan-Finch Oil Corporation

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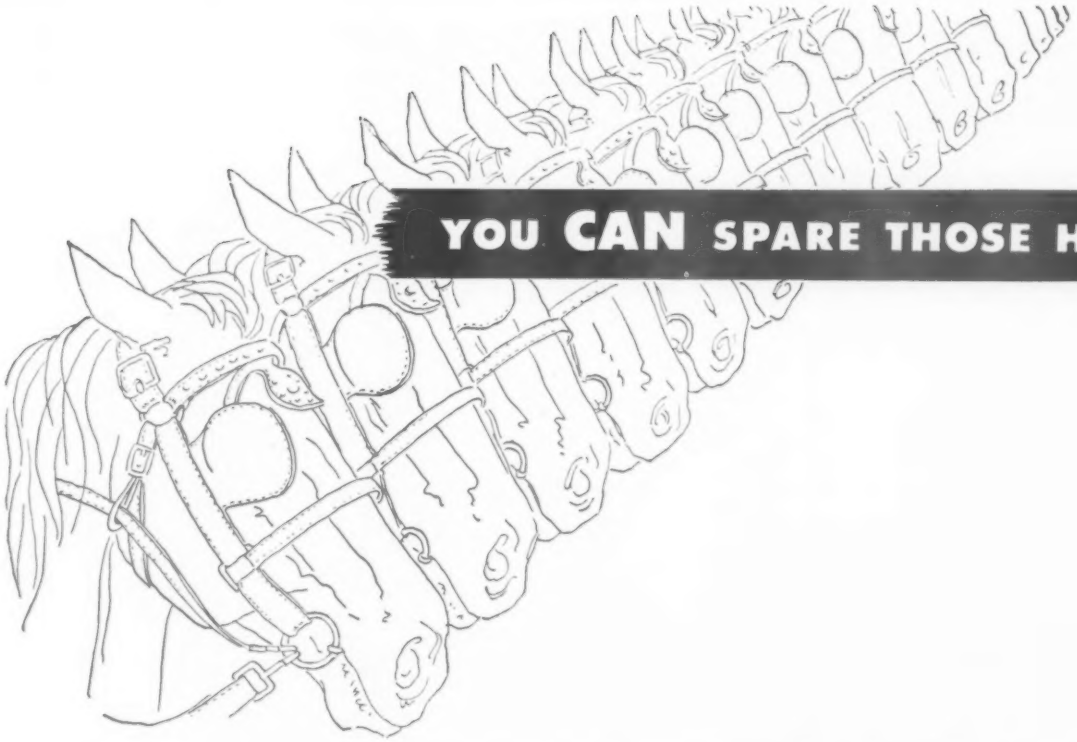
NATIONAL STEEL CORPORATION

EXECUTIVE OFFICES: PITTSBURGH, PA.

BRANDS: Buffalo · Detroit · Susquehanna GRADES: Basic · Foundry · Malleable · Ferro-Silicon · Silvery



YOU CAN SPARE THOSE HORSES!

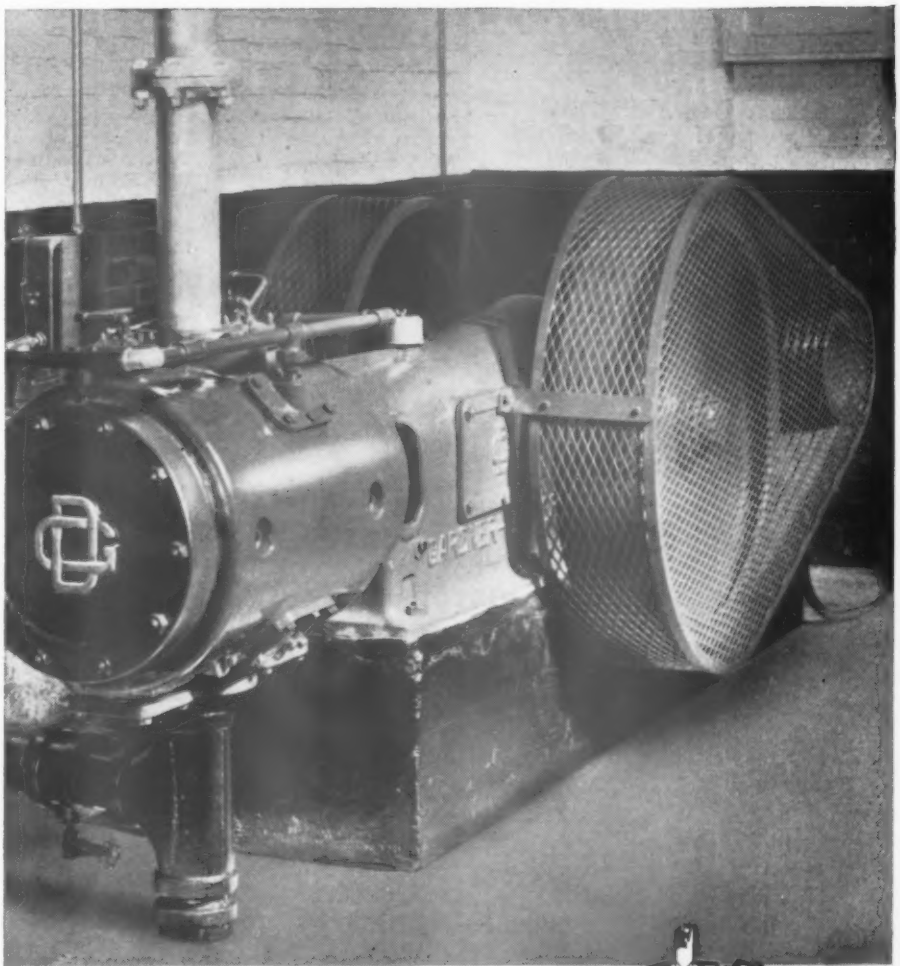
IT'S built especially to spare your horsepower—this Gardner-Denver "RX" Single-Stage Air Compressor. For here is a compressor that makes air do more work—yet uses remarkably little horsepower in the process.

"RX" performance is dependable—constantly—as is shown by user records from all over the country. Valve and port areas are large and unrestricted. Cylinder heads, valves and air passages are completely water-jacketed. No detail of design or construction has been slighted in making the "RX" Compressor a better compressor for the job—*your* job.

NOTE THESE ECONOMY-ASSURING FEATURES . . .

1. Air output is automatically regulated to fit air needs.
2. Maintenance costs are unusually low.
3. Rugged, dirt-free main frame.
4. Positive, flood-type lubrication system.

For complete information and specifications on Gardner-Denver "RX" Compressors, write Gardner-Denver Company, Quincy, Illinois.



GARDNER-DENVER *Since 1859*

For Efficiency

IN COMPRESSED AIR OPERATION

A MURPHY TRAP

WILL KEEP
THE AIR TANK DRY

THE MURPHY PISTOL SPRAYER

Thousands in use all over the world. A thirty-three year record of efficiency. Four sizes ⅛" to ½" pipe.

AUTOMATIC SEPARATORS . AFTERCOOLERS
HAMILTON SPRAY GUNS . EXTRUSION MACHINES

MURPHY SEPARATOR FILTERS

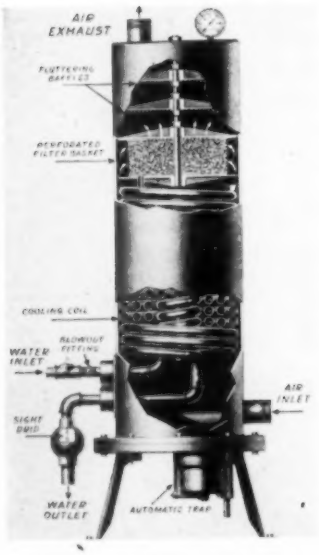
COMPLETE WATER ELIMINATION
FULLY AUTOMATIC

Trouble Free Operation for Years

Some core blowing machine manufacturers use the Type A as regular equipment. There are cases where 12 machines are operated from one large separator. Whether used for a single machine or for a battery they give 100 percent satisfaction. For Sand Blast purposes they have no equal.

A. S. F. AFTERCOOLER SEPARATOR FILTER

50 to 2000 cubic feet capacity



This is a modern design of high pressure air conditioner. Air enters the bottom at full tangent, getting 300 expansions with a whirling motion, ascends through the interstices of the specially wound water coil in thin streams which efficiently cools it. After being cooled the air passes through the filter basket, then through the fluttering baffles and delivers the air into the distributing lines in a clean dry condition.

It is best placed between the receiver tank and the distributing lines. This method takes advantage of the pre-cooling the air receives in the tank and pipes, saving the use of considerable water in the cooling operation.

THERE EXISTS NO AIR SITUATION SO BAD THAT IT CANNOT BE COMPLETELY REMEDIED BY US

JAS. A. MURPHY & COMPANY

HAMILTON, OHIO

PRODUCTS SHOWN AT BUFFALO CONVENTION BOOTH NO. 115

to help you get greatest equipment efficiency

Are you getting every possible pound of output from your foundry equipment?

If there is the slightest doubt in your mind, ask the Republic Pig Iron Metallurgist. He can tell you. Even if you feel satisfied with present output, he may be able to help you push it higher.

This metallurgist is not a "miracle man"—but he is an expert on irons and foundry practice.

He knows irons—what they will do—how they should melt, pour and solidify in the mould—and, too, why sometimes they do not behave as they should.

He knows how to get the most out of foundry equipment—for he has spent many years working in foundries of every type.

Tell us when you'd like him to call. The only obligation is his —and that to help you.

REPUBLIC STEEL CORPORATION
General Offices: Cleveland 1, Ohio
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York 17, N.Y.

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS—REPUBLIC CORE WIRE—FOUNDRY NAILS

BO

HAS PROVED ITSELF

CUT CLEANING TIME–

BONDITE'S superiority can be readily established — easily proven. Developed to meet individual foundry conditions, the proper use of BONDITE will save binder and new sand expense, will produce cleaner castings and will increase production in steel, iron and brass.

BONDITE, unlike some of the heavier binders, weighs but 4 lbs. per gallon. On ignition it produces a carbon type gas that thoroughly covers surface grains, giving them a protective coating against metal action — thus prolonging the life of any type of silica sand. The common type of binders now used, particularly on manganese, permit sand to fuse.

BONDITE, unlike other binders, works successfully in old sand — because there is less deterioration due to fusion and breakdown. Cores and facing sand made with BONDITE show more permeability, consequently finer grained sand can be used — thus producing smoother castings . . . castings that are true to core-box dimensions.

. . . . ATTENTION FOUNDRYMEN:

Bondite

IN ACTUAL PRODUCTION SINCE 1939

REDUCE SCRAP—INCREASE PRODUCTION

BONDITE is approximately 98% volatile and burns out almost completely with little or no residue. The gases produced have no detrimental action on metal.

BONDITE skins dry very easily and quickly, eliminating the need for oven drying — thus output is greater and production is increased.

BONDITE'S foundry-fitness has been thoroughly tested under conditions of all kinds to meet a wide range of requirements. BONDITE is helping to lower castings costs in many types and sizes of foundries. In one foundry alone, *cleaning time was cut from 8 hours to less than 1 hour's time!* Name of foundry will be furnished upon request.

BONDITE HAS IMPROVED ITSELF IN ACTUAL PRODUCTION SINCE 1939.

BONDITE can help you today in your efforts toward Victory — and with your plans for postwar production. BONDITE is available for immediate shipment — NOW! Write for further information and prices — ask for a sample and make a BONDITE test in your foundry today!

BONDITE

- Cleaner, smoother castings.
- Cuts waste, lowers costs.
- Reduces cleaning time, eliminates oven drying.
- Increases production in steel, iron, brass.
- Works successfully in old sand.
- Saves binder and new sand costs.
- Eliminates nailing, stops scabbing.

Bondite Corporation

3325 EAST 38TH STREET, LOS ANGELES 11, CALIFORNIA

844 150TH STREET, HAMMOND, INDIANA

Grinding Wheels

Fifty years ago The Carborundum Company introduced the first grinding wheel of a manufactured abrasive to the foundry trade

WE have come a long way since then—a long way in grinding wheel development—in the technique of grinding wheel manufacture.

Carborundum research through all these years has resulted in new types of abrasive grain, continuously improved bonding materials—an unprecedented advancement in the creation of wheel structures—plus the development of high speed resinoid bond wheels.

This progress is reflected in longer wheel life, faster and greater stock removal—a definite lowering of foundry grinding costs.

And it is a progress that is still going on, for Carborundum research, of course, never stands still.

Wise grinding procedure dictates that you make certain you are using the right wheel for a given job—right grit, grade and structure, the right type of abrasive. The use of the wrong wheel usually means loss of production, excessive wheel wear and excessive wheel and grinding costs.

Remember, please, that Carborundum Abrasive Engineering Service is maintained to help you get the most and the best out of your grinding wheels. It will pay you to take advantage of the knowledge and experience that is back of this service.

Grinding wheels are weapons for production—use them wisely and well. The Carborundum Company, Niagara Falls, New York.

* * *

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids.

CARBORUNDUM
TRADE MARK
ABRASIVE PRODUCTS

(Carborundum is a registered trade mark of and indicates manufacture by The Carborundum Company)

by CARBORUNDUM
TRADE MARK

PARASPRAY
PARASET • PARACOAT

Out of the Crucible of War
THE BIG 3
OF POST WAR FOUNDRY EFFICIENCY

READ WHAT THREE OF THE WORLD'S LARGEST FOUNDERS HAVE TO SAY

"Our experience shows us that we save in man power about 72 men per 1,000 heads costs and $1.182 per head."

★

"Welds in Rocker boxes have dropped to less than 2% and leaks in the same area on water test at 60 lbs. pressure to less than 3 10%."

★

"Effect an 8% saving in time and space in core making... Reduction of 25% in labor in melting and pouring unit ... Has resulted in general improved quality."

AIRPLANE production has the right of way as a vital factor in winning the war. Complicated aluminum engine cylinder head castings were one of the worst "bottle necks." Then most of American founders adopted Paraspray, improving quality and stepping up production. When released for general use, Paraspray — Paraset — Paracoat — will play an important part in efficient post war production of all metal castings. Keep ahead — investigate now — be ready for competitive futures.

- **PARASPRAY** Coremold Coating. Speeds production and efficiency by eliminating porosity and gas holes ... Reduces scrap losses ... Saves manpower ... Improves Quality.
- **PARASET** A unique core binder of cement containing rubber. Makes a strong core which gives off little gas, cutting porosity and gas holes to minimum.
- **PARACOAT** Pattern finish. Completely resists action of water, oil, acid or other elements used in core mold mixes. Dries quickly... longer life. Does not become "tacky" or sticky.

Sole licensees under the Saeger Patents exclusively regulating the use of rubber compounds in making and spraying cores and molds.

PARASPRAY CORE MOLD

PARASET CORE BINDER

PARACOAT FOR PATTERNS

FOUNDRY RUBBER COMPOUNDS CORP.

1050 30th Street, N. W. Washington 7, D. C.

COPY'T 1943—FRCC

Buy Bonds

Invest in Victory for your Country. Invest in future happiness for yourself. Loan every spare dollar to your Uncle Sam.

You'll get it back and more too, and in the days to come you may be able to buy and enjoy many of the things you always longed to possess.

You will also warmly relish the thought that you did your bit when it was needed most.

•

WOOD AND METAL PATTERNS · KELLER AND DUPLICATOR WORK · MACHINE WORK · MALLORY METALS · BERYLLIUM COPPER · MONEL METAL · EVERDUR CASTINGS

COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY

• • •

BRASS, BRONZE AND ALUMINUM CASTINGS

CITY PATTERN

FOUNDRY AND MACHINE CO.

1161 HARPER AVE. at RIVARD ST., DETROIT 11, MICH. EST. 1913

LION BINDER
is "a" Core Paste

the core may break —

but not at the Lion pasted joint

For any kind of core, either hot or cold, mix Lion Binder with plain water to consistency of heavy cream.

Cores pasted cold should be warmed in oven or with torch for fast setting. If not convenient to warm them, they will air dry.

Lion Binder mixes smoothly—no lumps.

Metal will not penetrate a Lion Binder pasted joint.

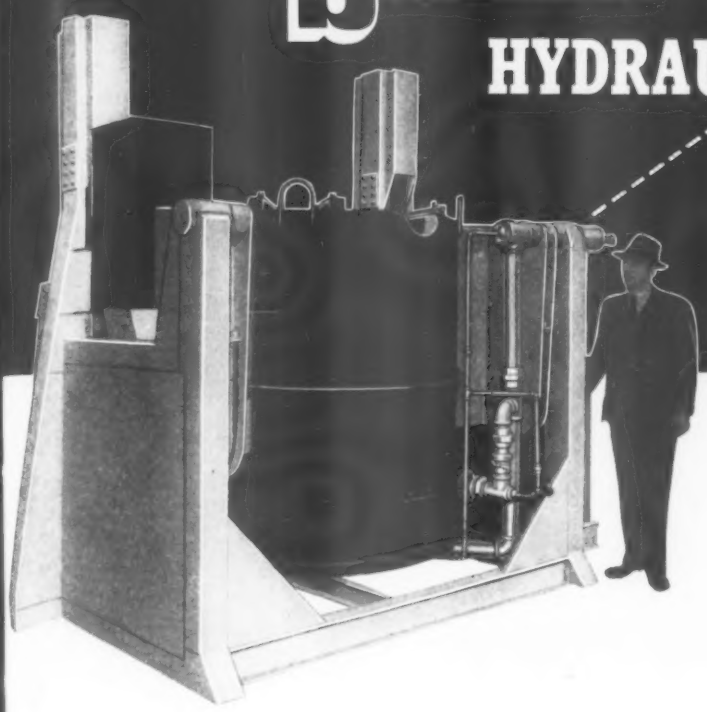
Metal lays nicely to Lion Binder.

Tie wires are not needed with cores pasted with Lion Binder.

MANUFACTURED ONLY BY

J. S. McCORMICK CO.
PITTSBURGH, PA.

SEE . . . . . THIS STROMAN HYDRAULIC TILT MELTING FURNACE



at the
3rd War Production
FOUNDRY CONGRESS
in Buffalo, New York
April 25 - 28

SEE this newest innovation in melting furnaces on display, complete with burner and blower, ready to start melting.

SEE the ease with which it tilts . . . the fool-proof manner in which the many safety devices work.

SEE the Stationary Lip Pour which allows the ladle to remain in a fixed position during an entire pour, thereby saving time and labor.

SEE the Variable Speed Pour feature which automatically controls the speed of pour and the size of stream as desired by the operator.

SEE the perfect combination of a Stroman Blower and Burner that results in minimum fuel costs and correct heat distribution.

AND NOTE . . . this Hydraulic Tilting Furnace melts Brass, Aluminum or Magnesium, and each type operates perfectly.

Stroman engineers are qualified experts of long standing on foundry layout and melting problems. Take advantage of their vast experience . . . bring your problems to them . . . we are certain they will supply the correct solutions.

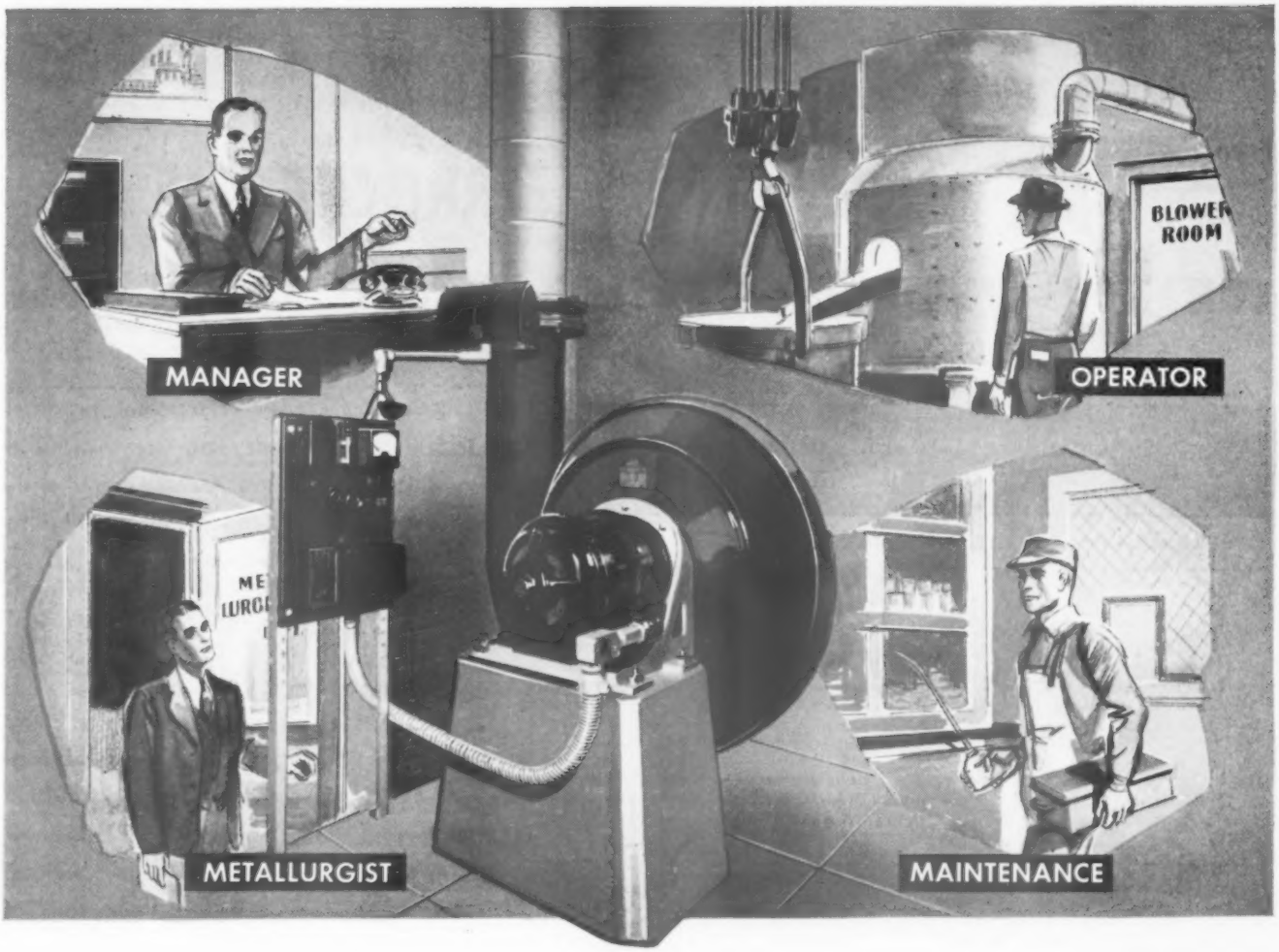
. . . and remember Stroman makes melting furnaces Stationary or Tilting in any desired capacity to handle Brass, Bronze, Aluminum, Magnesium and all other non-ferrous metals.
If you do not plan to attend the exhibition write at once indicating the type furnace you are interested in and information will be sent immediately.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO 6

POUR IT ON!
with
ALLOYS
SIPI
BRASS AND ALUMINUM
SILVERSTEIN AND PINSOF, INC.
CHICAGO
Copies of this poster without advertising free on request. SILVERSTEIN & PINSOF, INC., CHICAGO



A SUPERIOR FOUNDRY BLOWER

From Any Viewpoint

OPERATOR: "That Ingersoll-Rand Blower and constant air-weight control took the guess-work out of my job—everyone else knew just what he was doing in this shop, so if things went wrong, it was always my fault for not having the 'wind' right. Must have been so, too. The big boss says we now have hotter iron and fewer rejects."

MAINTENANCE: "What can I say? If all our shop equipment gave me no more to do than our cupola blower, I wouldn't have a job at all!"

METALLURGIST: "I went out on a limb for the Ingersoll-Rand principle of automatic air-weight control, and since our tonnage has gone up so much, I've been mighty glad I did. I hate to think of the rejects we could have with guess-work on the cupola blast."

MANAGER: "I know the boys are all pleased, and I am too. Our records show that we are turning out better castings, and our coke savings alone are going to pay for the blower in less than two years' time!"

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

12-434

COMPRESSORS • TURBO-BLOWERS • ROCK DRILLS • AIR TOOLS • CENTRIFUGAL PUMPS • CONDENSERS • OIL AND GAS ENGINES

SMZ ALLOY and SM FERROCHROME can help you make better iron at lower cost

ELECTROMET FERRO-ALLOYS AND METALS FOR THE FOUNDRY

Added to the Cupola	*Result*
EM Silicon Briquets (round)	Deoxidize and aid machinability by graphitizing effect. Reduce chill in light sections. Permit the easy control of silicon additions.
EM Chromium Briquets (hexagonal)	Increase hardness, wear resistance, corrosion resistance, and heat resistance. Promote greater density. Permit easy control of chromium additions.
EM Silicomanganese Briquets (square)	Act as a scavenger. Harden iron when added in large quantities. Permit easy control of manganese additions.
Added to the Ladle	*Result*
85% Ferrosilicon 50% Ferrosilicon	Deoxidizes and aids machinability by graphitizing effect. Reduces chill in light sections. (The 85% grade is used for large additions.)
Silicon-Zirconium	Deoxidizes and graphitizes, improving density of iron.
Ferromanganese-Silicon	Combines graphitizing influence of silicon with scavenging action of manganese.
Ferromanganese	Acts as scavenger. Hardens iron when added in large quantities.
Foundry-Grade SM Ferrochrome (Designed for rapid solubility)	Increases hardness, wear resistance, corrosion resistance, and heat resistance. Promotes greater density.
Ferrovanadium	Refines grain (of value particularly in improving impact strength of hard irons).
SMZ Alloy	Converts normally hard iron into high-strength gray iron. Reduces chill. Improves strength and physical properties.
CMSZ Alloy	Improves wear resistance without sacrificing machinability. Gives chromium effects without increasing chill.
Calcium-Manganese-Silicon	Combines three active elements, providing an excellent scavenger for oxides, gases, and non-metallic impurities in cast steel.
Calcium-Silicon	Deoxidizes in the ladle, forming a low-melting point slag. Cleans the metal of oxides and other non-metallic inclusion.
Calcium Metal	Combines readily with oxygen and other gases. Acts as deoxidizer, degasifier, and reducing agent.

These Products will be displayed in the Electromet Exhibit Area at the 1944 Foundry Show

Among the many Electromet products important to foundrymen are two ladle addition alloys — SMZ Alloy and SM Ferrochrome — which foundrymen are finding especially useful today.

You Should Know More About SMZ Alloy

This is an unusual ladle addition alloy that can help you produce iron of consistently higher tensile strength. Production figures on many hundreds of heats show that additions of SMZ alloy give uniform results. You can be sure of the quality of your iron when you use SMZ alloy.

Have You Tried SM Ferrochrome?

If you want to make ladle additions of chromium, SM ferrochrome will give the best results. Since it dissolves faster than ordinary ferrochrome, you can add a higher percentage of chromium. Since SM ferrochrome is quickly and completely dissolved, there is a uniform distribution that eliminates formation of hard spots.

A staff of technically trained metallurgists can give you on-the-job assistance in the use of these and other Electromet alloys. If you have a problem involving alloys, call on them.

Electromet
Trade Mark
Ferro-Alloys & Metals

"Electromet," "EM," "SM," "SMZ," and "CMSZ" are trade-marks of Electro-Metallurgical Company.

Get the latest information on EM Briquets

THE BRIQUETS with a 12-year service record

For 12 years, progressive foundrymen have used EM briquets for cupola additions of silicon, manganese, and chromium. They have used this accurate and convenient method for adding alloys because EM briquets permit high recovery of the alloying elements; silicon can be recovered up to 90 per cent; manganese up to 85 per cent; and chromium up to 95 per cent.

The reason for this high recovery is the special binder *which will not burn* in passage through the cupola. Thus the alloy is protected all the way to the melting zone, and oxidation losses are kept at a minimum. Write for the booklet, "Briquetted Alloys for the Cast Iron Foundry."

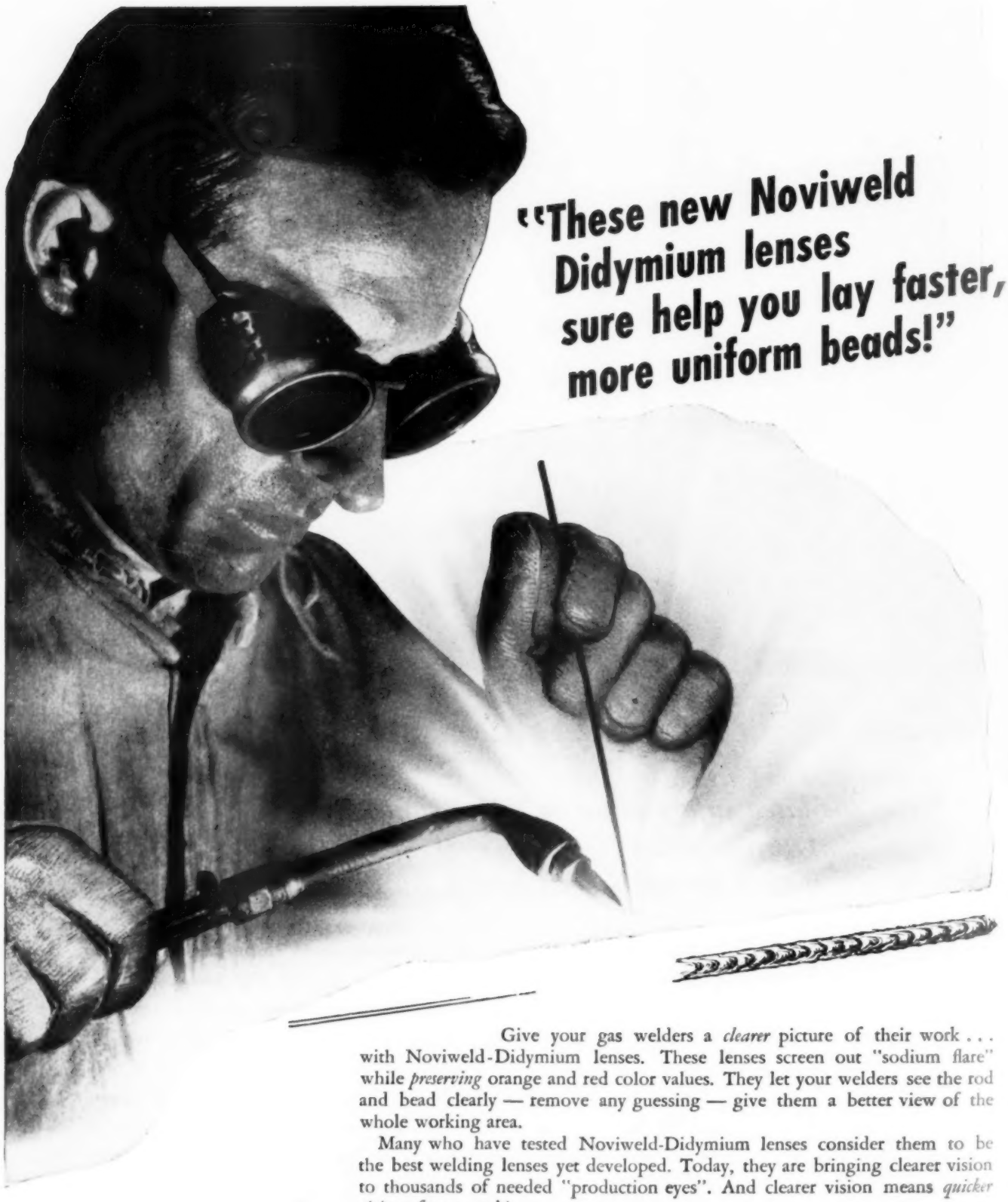
BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

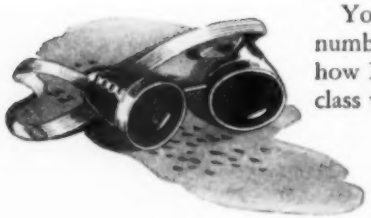


"These new Noviweld Didymium lenses sure help you lay faster, more uniform beads!"

Give your gas welders a *clearer* picture of their work . . . with Noviweld-Didymium lenses. These lenses screen out "sodium flare" while *preserving* orange and red color values. They let your welders see the rod and bead clearly — remove any guessing — give them a better view of the whole working area.

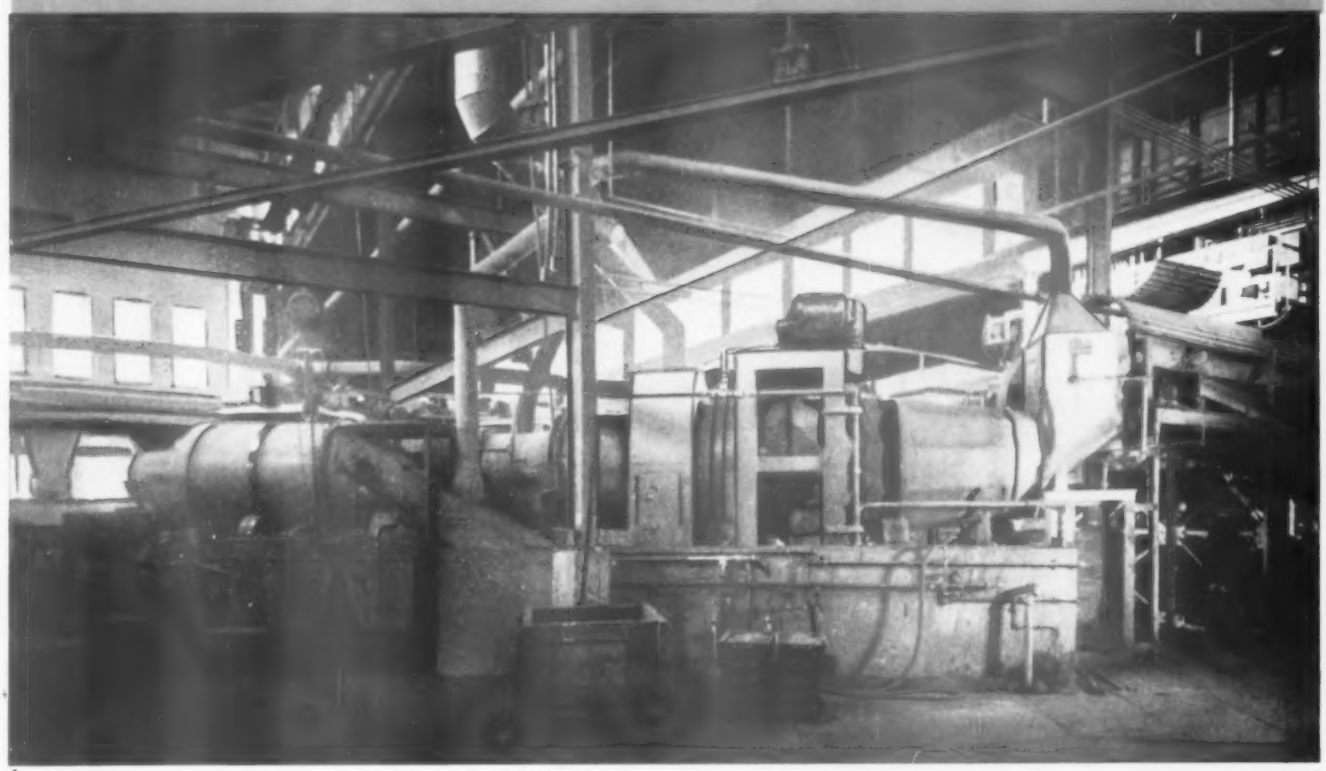
Many who have tested Noviweld-Didymium lenses consider them to be the best welding lenses yet developed. Today, they are bringing clearer vision to thousands of needed "production eyes". And clearer vision means *quicker* vision, faster work!

You can get immediate delivery of Noviweld-Didymium lenses in shade numbers 3, 4, 5, and 6. Your AO Safety Representative will gladly show you how Noviweld-Didymium can help your flame welders and burners do higher class work rapidly, accurately. Ask him for a demonstration *now*.



American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

Ransohoff Automatic Star-return WET CLEANING MILLS



70 TONS IN 8 HOURS

FROM start to finish this tremendous quantity of cleaning is *automatic* . . . from shake-out to sorting conveyor . . . without manual handling. In *your* plant you too, can cut corners on costs with RANSOHOFF WET CLEANING MILLS.

SAVE 30% TO 70%

The RANSOHOFF WET METHOD is so successful because castings cascade in a mass in which stars fill all voids completely. Cleaning is very rapid. No nicking, breaking or mill wear. Wet method eliminates health hazards and dust collectors.

SEND US A SAMPLE BATCH . . . we'll give you the proper recommendations.

Illustrated:

60" x 84" END-LOADING, END-UNLOADING WET CLEANING MILL with cooling conveyor from the shake-out. Conveyor collects a complete batch of work which is fed into the cleaning mill. After cleaning, work is discharged into the holding and feeding drum which feeds it at a uniform rate onto a sorting conveyor. Cooling conveyor and mill are equipped with time switches so that entire equipment functions automatically without labor. Machine shown is handling malleable pipe fittings before annealing.

N. RANSOHOFF, Inc. CINCINNATI, OHIO
Township Ave. and Big 4 R. R.

EFFECTIVE REMOVAL OF SURFACE DEFECTS...

WEBS AND FINS

by Flame Gouging

Flame gouging permits speedy and thorough removal of surface flaws and cracks in castings. It cannot cover up defects which should be removed, and which, when inadvertently concealed, not only lower the quality of the finished casting but also may be a potential hazard during its use.

In removing webs and fins, flame gouging permits remarkably fast working speeds. For example one web-removing job that formerly required 2½ days is now performed in 45 minutes by this method. In addition flame gouging does a neater, more efficient job than was possible with former procedures.

For complete information on Airco flame gouging call or write to your nearest Air Reduction office.

★ ★ ★

If you are planning to attend the Third War Production Foundry Congress, Buffalo Memorial Auditorium, Buffalo, N. Y., April 25-28, be sure to visit the Air Reduction booth.

★ BUY UNITED STATES WAR BONDS ★

AIRCO WILSON

AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS

Offices in all Principal Cities

Thorough Sand Conditioning
is essential to successful operation

● Bartlett-Snow Conditioning Equipment, gives the sand new life under mechanically controlled conditions. It provides a more uniform, and more thorough mix than can possibly be secured in daily production with hose and shovel methods,—and the work is done usually overhead, resulting in great savings of floor space.

Lost molds are fewer when Bartlett-Snow mechanized conditioning methods are used. The number of defectives is lower. Output per given floor area is much increased, permitting the "overhead" to be distributed over a larger production resulting in a less costly, more salable product. The efficiency and the health of the workers is much improved. The cost of the equipment need not be large. Frequently, quite great savings are secured from modest installations.

Our recently issued 40-page Foundry Bulletin No. 91 which illustrates many different arrangements of sand conditions plants and other Bartlett-Snow Foundry Equipment,—will be of great interest to every foundryman. Send for a copy!

THE C. O. BARTLETT & SNOW CO.

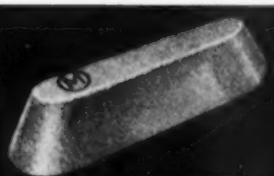
6201 HARVARD AVENUE • CLEVELAND, OHIO

Engineering and Sales Representatives in the Principal Cities

FOUNDRY SAND, MOLD AND CASTINGS HANDLING
• • DUST AND FUME CONTROL SYSTEMS • •

THE only thing that interests you about non-ferrous ingot made by Michigan Smelting is the kind of castings you can make from it in your own plant. How accurately do we hold to your specifications so that wastage and spoilage will be held to an absolute minimum? On that point the "know-how" of this organization is important to you. For it is your guarantee of satisfaction with our product. Fifty years of experience in the refining of non-ferrous scrap, plus up-to-the-minute equipment, enable Michigan Smelting to make ingot to the most rigid and exacting specifications —a product that in many respects is superior to alloys of virgin metals.

BUY
WAR
BONDS



REFINERS OF NON-FERROUS SCRAP
METALS FOR OVER 50 YEARS

MICHIGAN SMELTING and Refining

Division of

BOHN ALUMINUM & BRASS CORPORATION · Detroit, Michigan

General Offices: Lafayette Building

THE PROPER FLASK SAVES TIME & SAND

ROUND FLASKS?

yes sir, Hines makes 'em . . .

● For castings such as fire pots, pulleys, sheaves, sprocket wheels, gears, etc., Hines Round Flasks are particularly recommended. Puts jobs on the bench and machines which were previously made on the floor. They replace tight boxes, eliminate shake-out costs and save valuable foundry space. You'll turn out more good castings with less sand. Companion jackets are machined to fit molds perfectly. Available in all diameters of even inches from 12″ to 34″.

THE HINES FLASK CO.

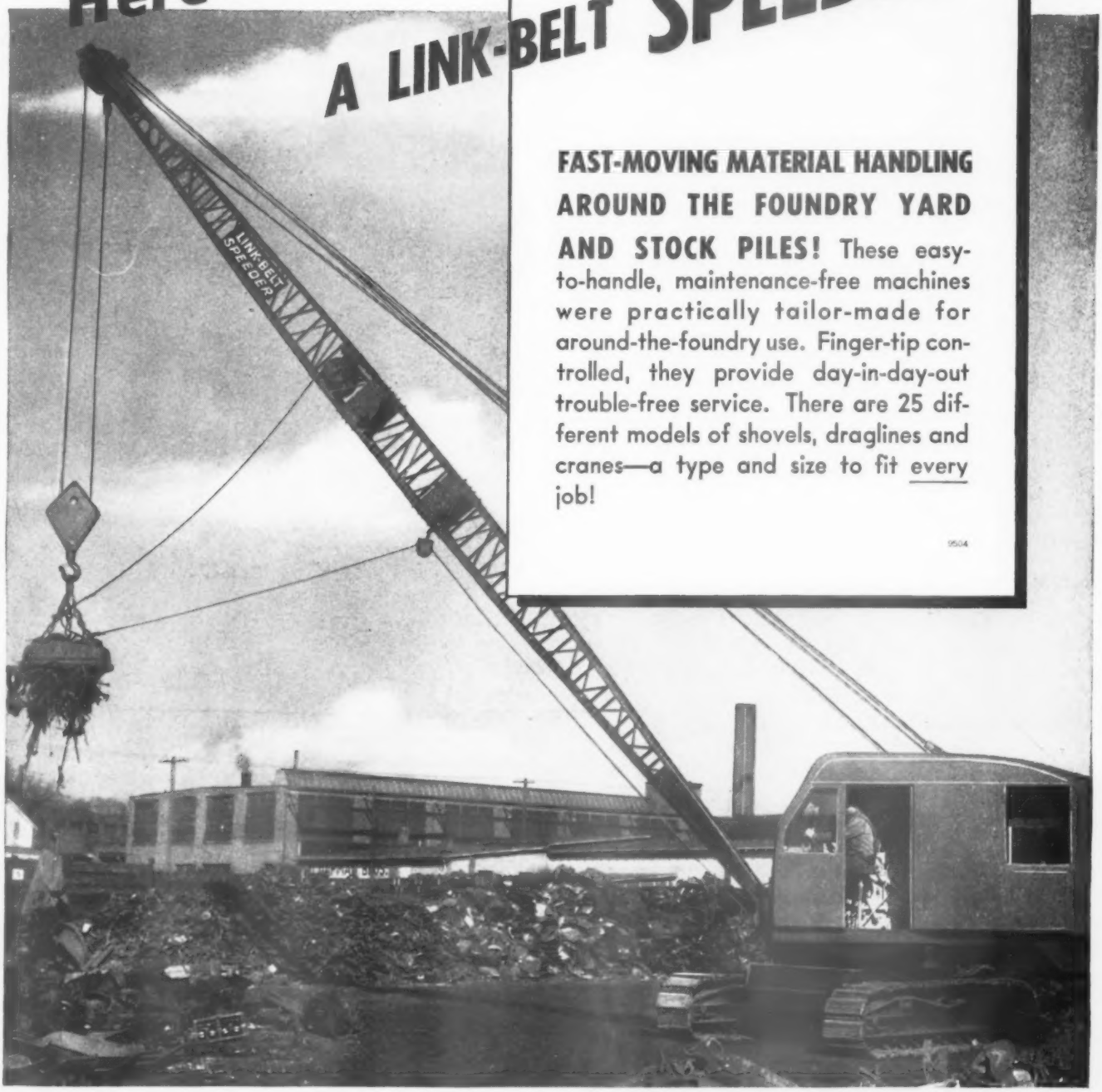
1324 HIRD AVENUE CLEVELAND 7, OHIO

Major
PRODUCTION
Operations
DEMAND THE BEST
And "the best" in Chaplets, Chills and Superchills (patented) has long been identified with the fine old name of Fanner.
Today, more than ever, when there can be no compromise with either time or quality in turning out the best possible castings in the shortest possible time, the need for these vital Fanner products is a very essential "must" in every successful production speed-up.
Our engineering experience is "at your service" in helping you take full advantage of speeding up your casting program with Fanner Chills, Chaplets and patented Superchills. Call on us.
PRODUCE for VICTORY but PLAN for PEACE

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio • The Canadian Fanner, Ltd., Hamilton, Ontario

Here's the reason it's called A LINK-BELT SPEEDER!



FAST-MOVING MATERIAL HANDLING AROUND THE FOUNDRY YARD AND STOCK PILES! These easy-to-handle, maintenance-free machines were practically tailor-made for around-the-foundry use. Finger-tip controlled, they provide day-in-day-out trouble-free service. There are 25 different models of shovels, draglines and cranes—a type and size to fit every job!

9504

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
(A DIVISION OF LINK-BELT COMPANY)

Clearing the Air for VICTORY

System installed by KIRK & BLUM *Collects fine Aluminum Dust* SPEEDS WAR PRODUCTION

This specially designed, high efficiency dust collecting system—installed in the new Cincinnati plant of Aluminum Industries, Inc.—is just one example of the expert engineering service provided by Kirk & Blum.

The installation uses three exhausters for flexibility in operation. The collector is of sufficient size to receive the total volume of air, from the 3 systems.

In the grinding department (large photo) the fine aluminum dust is transported 230 feet direct from grinding machines to collector. Photo in circle shows specially designed mold spray booth built around a roller conveyor—installation using modern type axial flow fan.

The Kirk & Blum engineering staff, qualified by over 36 years of experience in the field of dust control, offers a *specialized* service that is indispensable for planning and installing a truly efficient system.

If you have a dust control problem, PLAY SAFE—get the unbiased counsel and scientific planning and installation of *experts*—Kirk & Blum Engineers!

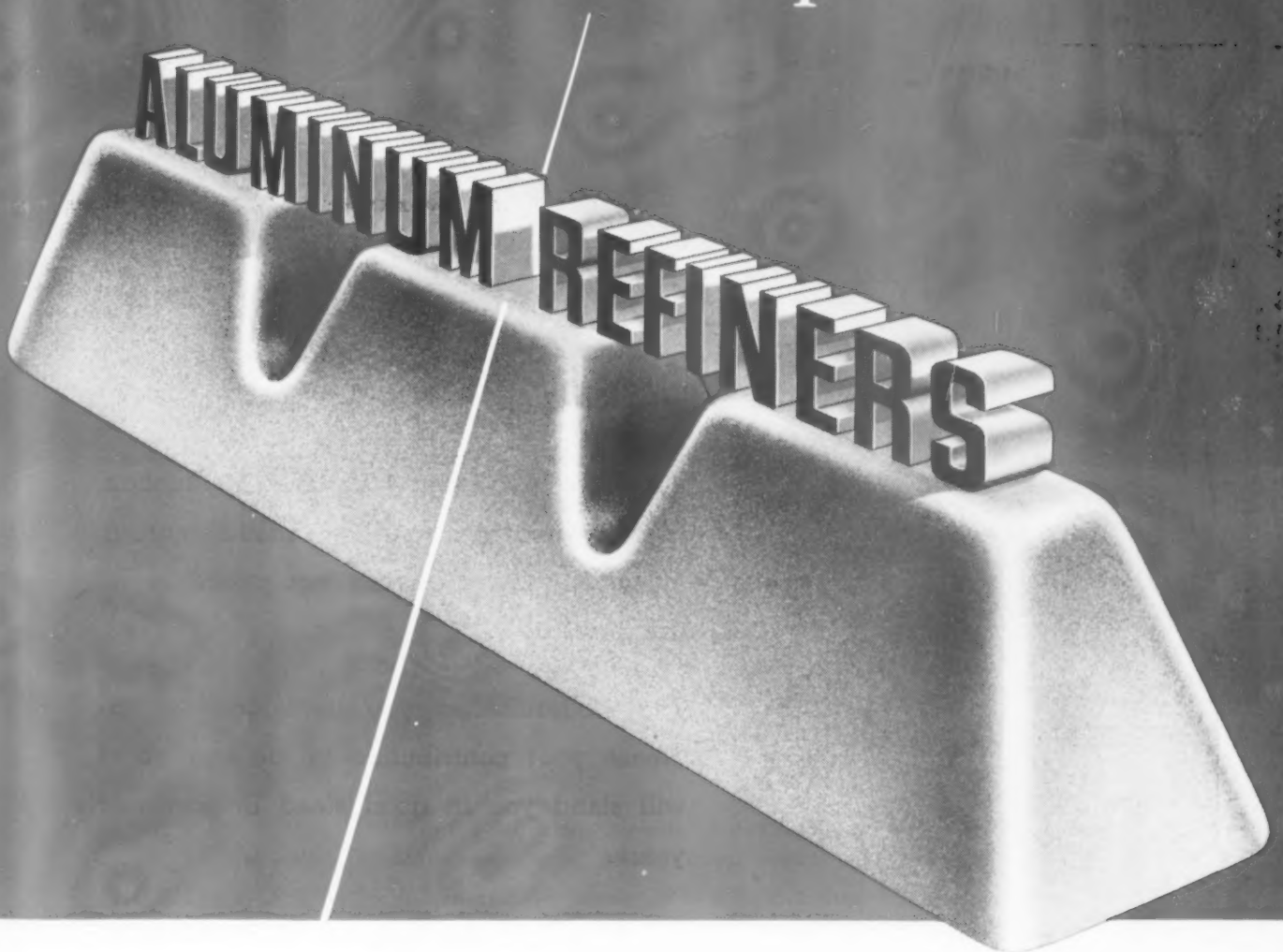
Send for any of these Booklets

"Dust Collecting Systems in Metal Industries"
"Fan Systems for Various Industries"
"Blower Systems for Woodworking Plants"
"Industrial Ovens"
"Cooling Systems for the G'ass Industry"
"Data on Kirk & Blum Production Facilities"

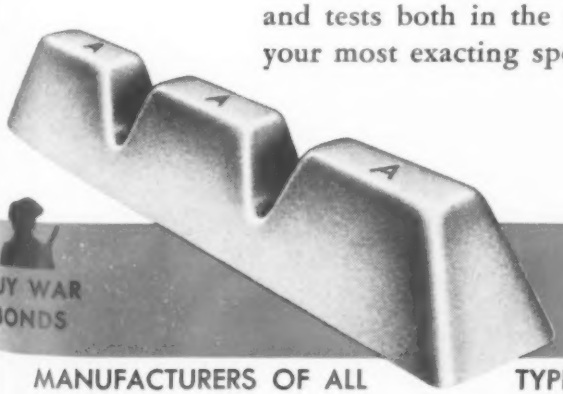
KIRK AND BLUM
AN ORGANIZATION OF ENGINEERS AND MECHANICS

THE KIRK & BLUM MANUFACTURING CO. 2860 SPRING GROVE AVE., CINCINNATI, OHIO

Aluminum Alloy Ingot of Uniform Composition



AS YOU well know, uniformity in composition of aluminum alloy ingot is a mighty important thing from your standpoint. Ingot that exactly meets your specifications—that is free from all impurities—smooths the way for the making of perfect castings. It keeps down production costs—increases profit. That is exactly the kind of alloy ingot you get from Aluminum Refiners. Checks and tests both in the smelting room and in the laboratory assure that your most exacting specifications are met—exactly on the nose!



BUY WAR BONDS

ALUMINUM REFINERS

Division of

BOHN ALUMINUM & BRASS CORPORATION · Detroit, Michigan

General Offices: Lafayette Building

MANUFACTURERS OF ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS

Looking Ahead!

The miracle of American War Production was produced by American manufacturing methods. Labor saving equipment is at the heart of it.

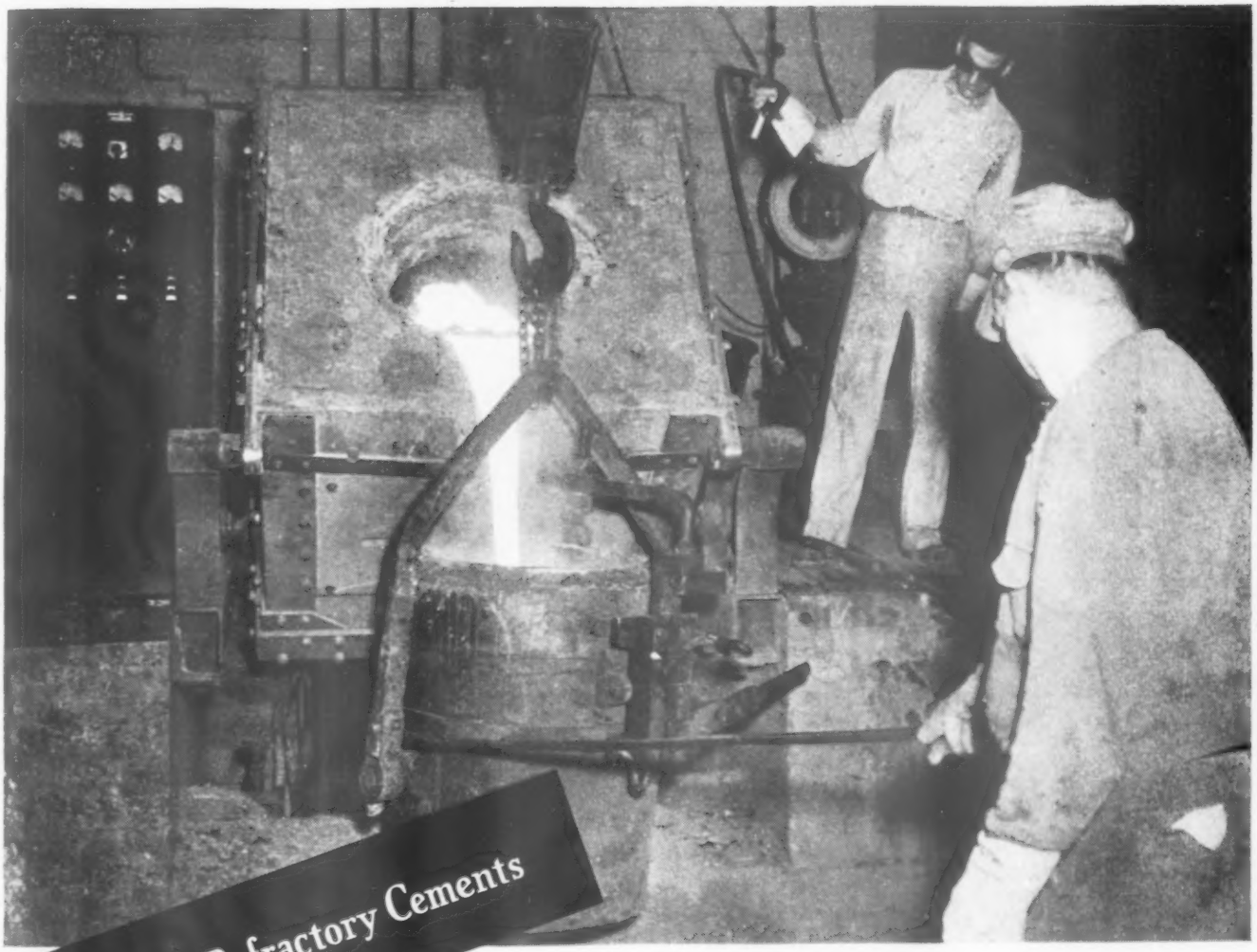
The modernization you have done to increase your contribution to the war effort will stand you in good stead in post war years.

If you haven't yet taken full advantage of Clearfield Sand Mixer economies, let us tell you about them.

We will be at the Buffalo Foundry Convention.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.



Norton Refractory Cements

Norton Refractory Cements are finding wide and successful application in the melting of non-ferrous metals. Among these cements are:

RC 1131—a CRYSTOLON (silicon carbide) cement of high refractoriness for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum. Also recommended for melting copper and zinc.

RM 1169—a fused magnesia cement, ideal for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys.

RA 889—an ALUNDUM (electrically fused alumina) cement recommended for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces.

RM 1140—a fused magnesia cement for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys (more than 85% copper), copper-nickel alloys, nickel silver, and cadmium bronzes.

R-876

NORTON COMPANY
WORCESTER 6 • MASSACHUSETTS

Norton *Longer Lasting* **Refractories**

DELTA

FOR *faster* PRODUCTION OF SMOOTHER, BETTER CASTINGS

DELTA CORE & MOLD WASHES CUT CLEANING ROOM COSTS

For STEEL—For GREY IRON AND MALLEABLE
For NON-FERROUS METALS

All DELTA Core and Mold Washes are Dilatometer proven for hot strength to insure positive adherence to core and mold surfaces. They produce high-fusion, highly-refractory surfaces which are absolutely moisture-proof. They eliminate gas formation and are non-reactive in contact with molten metals.

DELTA MUDDING COMPOUNDS

For mudding joints and patching cores for various metal castings. Non-reactive with molten metals... waterproof... will not crack, peel nor flake. Seal joints perfectly preventing gas leakage from core and producing smooth castings at joint areas.

DELTA PARTEX—Nut Shell Parting

The modern, scientific Lycopodium replacement... more economical and most efficient. Absolutely safe and non-hazardous to use.

DELTA NO-VEIN COMPOUND

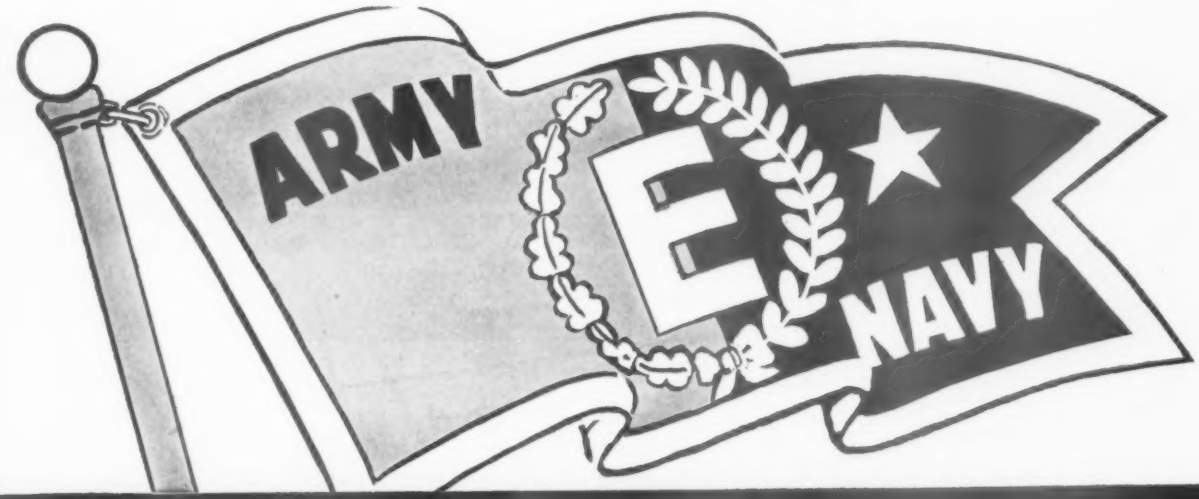
A combination of oxides specially compounded with other chemicals... use to eliminate veining and penetration and produce smooth, clean casting surfaces.

DELTA SPRAY BINDERS

For green sand molds. Produce almost instantaneously dry mold surfaces eliminating hours of oven or torch drying. Easy and economical to use.

DELTA CORE OILS

Compounded to meet the most exacting requirements in all phases of foundry core work. Laboratory standardized and checked for high tensile strength — low gas and fast baking.



FOUNDRY PRODUCTS

To better, more scientifically serve the foundry industry the entire DELTA laboratory is devoted exclusively to research in foundry problems and to the development of new and improved DELTA products for foundry use.

A VIEW OF THE DELTA FOUNDRY RESEARCH LABORATORY

1. Showing Complete Core Testing and Tensile Machines.
2. Sintering Machine
3. Dilatometer
4. Baking Oven
5. Sand Muller
6. Plus all other physical and chemical testing equipment necessary to maintain the most rigid standards of uniformity in quality and result-producing efficiency.

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MANUFACTURERS OF
INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS
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WASHED DRIED AND SCREENED SILICA SAND

Carefully Selected and Graded for Foundry Use—

FOUNDRY men throughout the country know the exceptional qualities of the uniformly screened grades of silica sand produced by the Ottawa Silica Company.

The grains being almost spherical, afford greater permeability and consequently finer sand can be used, effecting better finish.

Ottawa sands are durable! They do not break up! They are ideal for sand slinger work and are without equal for all foundry purposes where synthetic sands are employed.

FLINT
MOLDING AND CORE SAND
SILICA

A HARD, fast-cutting, thoroughly washed, dried Sandblast Sand, screened to uniform size, is produced by the Ottawa Silica Company and sold under the trade names FLINT SHOT and DIAMOND SANDBLAST SAND. It is the most economical agent that can be employed for all kinds of exacting sandblast cleaning. The round, pearl-like grains are hard as flint. They do not split up, but wear down uniformly and can be used over again many times. This abrasive flows freely, requiring less air power and gives the castings a smooth, silvery-like, velvety finish. Ask for our booklet, "Sandblasting Up To Date".

FLINT
IT PAYS TO USE
SHOT

DIAMOND
SAND BLAST

THE Ottawa Silica Company's three mills operate continuously the year round, making it possible to supply foundries with material promptly. Production includes a complete line of foundry sands suitable for molds, cores, furnace bottoms, sandblasting, for use generally in the steel, grey iron and non-ferrous fields—also Ground Silica (Silica Flour). The Ottawa Silica Company's engineering staff is always available for consultation and service on problems relative to the use of Ottawa Sands.

CRYSTAL
99⅝%
PURE
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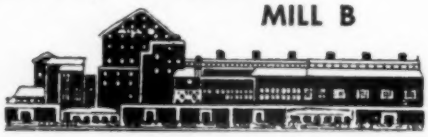
OTTAWA SILICA COMPANY

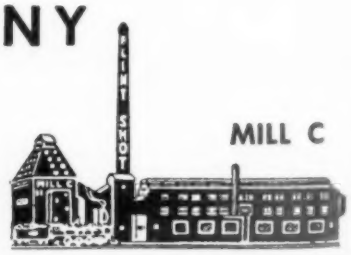
Ottawa, Illinois

MILL A

MILL B



MILL C



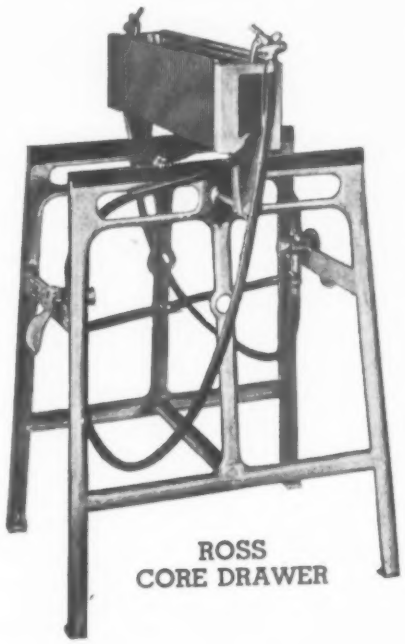
BETTER FOUNDRY EQUIPMENT

GAST CORE AND MOLD SPRAYER

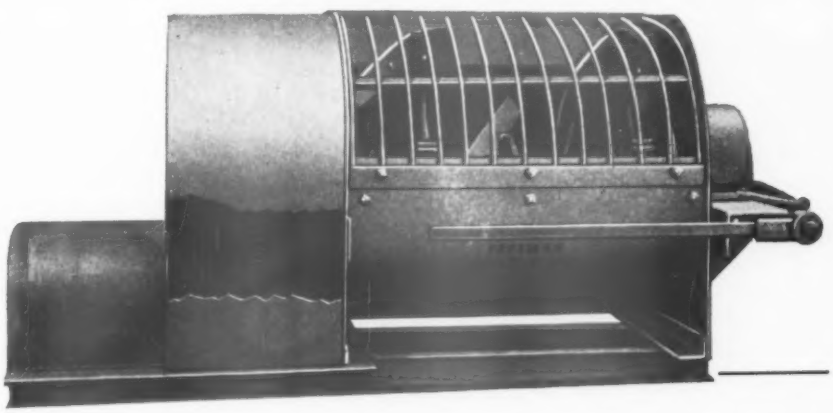
GAST CORE AND MOLD SPRAYER—This is a low-pressure, large jet atomizing sprayer, equipped with an air motor. It has a gear driven, paddle agitator for applying any type of wash to either green or dry sand molds or cores. It is regularly used with silica, naphtha or gasoline, talc and synthetic washes as well as the graphite or coke based materials. Wash is kept in suspension by paddle agitator when sprayer is used. Send for the whole story!

ROSS CORE DRAWER—If you are faced with a manpower problem (and who isn't?), remember that highly skilled labor is not required to draw cores on this machine and the more difficult boxes can be drawn just as fast as the easy ones. Many core boxes require no rigging at all. The Ross Core Drawer makes cores come true to size. Write for descriptive folder.

FREEMAN MULTI-BLADE FOUNDRY MIXER—Here is a mixer which has everything built-in as standard equipment, and includes many features not even available as accessories on other mixers. Send for a new booklet which explains how differently this mixer is built and just what you may expect of its operation in your plant.



ROSS
CORE DRAWER



FREEMAN MULTI-BLADE
FOUNDRY MIXER

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Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

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⅜" — ½" — ½" THICK ANY SIZE

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SEND for special Dowmetal Pattern Plate pamphlet showing sizes and prices. Made in any size or style and shipped the same day order is received. Must have priority and END USE. We are listing prices of a few of the thousand sizes we can furnish from stock.

WE ALLOW 1" FOR FLASK AND 2½" ON EACH END FOR PINS AND EARS

FLASK SIZE	THICKNESS 1/16"	THICKNESS 3/8"	THICKNESS ½"	FLASK SIZE	THICKNESS 3/8"	THICKNESS ½"
10 x 12	$4.10	$4.90	$ 6.55	16 x 16	$ 8.95	$11.95
11 x 14	4.90	5.90	7.85	17 x 17	9.85	13.15
12 x 14	5.30	6.35	8.45	18 x 18	10.80	14.40
12 x 18	6.30	7.55	10.10	20 x 20	12.85	17.10
13 x 14	5.65	6.80	9.10	22 x 22	15.00	20.00
13 x 17	6.50	7.80	10.35	24 x 24	17.50	23.25
14 x 14	6.05	7.25	9.65	26 x 26	20.00	26.50
14 x 20	7.80	9.35	12.45	28 x 28	22.75	30.25
15 x 15	6.75	8.10	10.80	30 x 40	32.50	43.25

We must have priority and END USE

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Pattern Shop & Foundry Supplies & Equipment

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1152 East Broadway **TOLEDO 5, OHIO** **Tel. TAylor 4624**

Convention To Further War Production And Indicate Postwar Trends

MAKING the castings to finish the war continues the primary objective of the foundry industry. The majority of foundrymen throughout the United States still are faced with heavy demands for castings to be used in building war materiel, constructing transport equipment, and providing essential civilian needs, and these demands must be met on schedule, in spite of crippling manpower shortages which promise to become more acute in the near future. The staggering blows that our air forces are administering the continent of Europe and the islands of the Pacific, the success of our landing operations against German and Japanese held territories, the victories of our fighting men on the field of battle, and the successful transportation of men and materials to the battlefronts and military outposts scattered throughout the world depend to a considerable extent upon castings, which have been used so generously in building for war. Huge quantities of these castings still are needed.

Immediate planning for the postwar period should be the secondary objective of the foundry industry. Attention should be given now to meeting the problems already being created in many plants through cutbacks in requirements for certain types of war equipment, and the greater problems which will arise when peace again comes and castings once more can be used to build for the civilian population. Careful study will be required to apply the progress and the lessons provided by the war in meeting the competitive situations that will develop with the coming of peace.

Excellent assistance in meeting both objectives will be provided at Buffalo, April 25 to 28, when the American Foundrymen's Association stages its third War Production Foundry Congress and Foundry Show in connection with its forty-eighth annual convention. The technical program and the large exhibition of foundry equipment and supplies will provide a review of the splendid progress which has been made during these war years, display the newer developments in the fields of supplies and machines, and present a valuable picture of production and product trends in the years immediately ahead. Through the free exchange of ideas and information, war production will be benefited and the foundry industry will be strengthened.

Work of the A.F.A. in the year since the St. Louis convention should be a source of considerable pride to the national and chapter officers, the staff at the central office, and the association membership at large. During that period the association has been strengthened through a further growth in membership, and an increase in the number of companies making greater contributions to the work of the association through sustaining memberships. The family of A.F.A. chapters, a most important contributor to the virility of the association, has been increased further through establishment of the Texas and Rochester chapters, and preliminary steps have been made for a chapter in the Canton-Massillon district. Exceptional programs have contributed to increased attendance at many chapter meetings, a gratifying record accomplished in the face of growing transportation difficulties.

Committees of the association, which cover almost every phase of foundry practice, have been unusually active during the year, and many of the reports prepared by these groups either have been published or are in process. New editions of the *Cast Metals Handbook* and *Alloy Cast Irons* will come from the press shortly, and *Recommended Practices for Sand Casting Nonferrous Alloys, Magnesium Alloys Foundry Practice, Symposium on Malleable Iron Melting,* and *Code of Recommended Practices for Industrial Housekeeping and Sanitation* already have been published. The first contribution of the Cupola Research Project, namely a *Handbook on Cupola Operation,* is in the course of publication. Several new committees have been organized, including the Committee on Chill Tests, the Committee on Deformation of Foundry Sand, and the Castings Inspection Committee.

The association activities for the year will culminate at Buffalo with an excellent program of technical papers, roundtable discussions, shop courses, and one of the largest foundry shows—measured from the standpoint of number of exhibitors—in the history of the organization.

Since the beginning of the emergency, the foundry industry has done a marvelous job in serving the nation in time of war. The 1944 War Production Foundry Congress and the Foundry Show not only should help speed the completion of this job, but should point to some of the trends of the postwar period.

Frank G. Steinebach
Editor

PROGRESS of the foundry industry in meeting the requirements of war production will receive intensive study during sessions of the third War Production Foundry Congress to be held in Buffalo, April 25-28. This 48th annual convention of the American Foundrymen's Association—the third successive national meeting under wartime conditions—will provide a review of technical developments which have improved the usefulness of castings as components of war materiel, and which will enhance the competitive position of cast products in postwar markets. The comprehensive Foundry Show which will be conducted during the four-day congress, likewise will feature the betterments in casting quality effected by the most modern foundry equipment and materials.

The national convention is returning to Buffalo for the third time in history and for the first time since 1912. While the Western New York Chapter of the A.F.A. is host to the congress, its various committees in charge of local arrangements include many association members who now are identified with the recently-established Rochester Chapter.

Committees Appointed To Arrange for Activities

Supervising congress activities of the Western New York Chapter is a general committee with Henry D. Miles, Buffalo Foundry & Machine Co., and N. K. B. Patch, Lumen Bearing Co., both past presidents of the A.F.A., as honorary chairmen. Other officers of the committee are as follows: General Chairman, Frank E. Bates, Worthington Pump & Machinery Corp.; Vice Chairman, Reinhold D. Loesch, Lake Erie Foundry Co.; Treasurer, Martin W. Pohlman, Pohlman Foundry Co. Inc., and Secretary, J. Ralph Turner, Queen City Sand & Supply Co.

Other committees have the following chairmen: Hotel and Housing, A. J. Heysel, E. J. Woodison Co.; Transportation, Martin J. O'Brien, Symington-Gould Corp.; Publicity, Leslie C. Thellemann, Inter-Allied Foundries of New York State; Solicitation, Van Loan Whitehead Jr., Whitehead Bros. Co.; Arrangement, Henry C. Winte, Worthington Pump & Machinery Corp.; Preview, Ralph T. Rycroft, Jewell Alloy & Malleable Co. Inc.; Ladies, Mrs. J. Ralph Turner; Special Events, Henry F. Sproull, A. P. Green Firebrick Co.; Reception, Theodore H. Burke, Otis Elevator Co.; Dinner, George

Foundry Congress

to Review INDUSTRY'S WARTIME PROGRESS

Michie, Electro Refractories & Alloys Corp. Photographs and names of various committee members appear on pages 110 to 119 of this issue.

Tentative program arranged by the Ladies committee includes a reception and tea on Tuesday, a trip to Niagara Falls on Wednesday, a bridge and bingo party Thursday afternoon with a theater party in the evening, and a luncheon on Friday.

A full program of technical sessions has been scheduled, including morning, afternoon and evening meetings during the four days. However, sessions pertaining to individual subjects, such as gray iron, malleable, steel, brass and bronze, etc., will be concentrated in three successive days. Discussions on subjects of general interest will be held throughout the week.

The congress will open with a meeting at 10:00 a.m. Tuesday, April 25, at which Lee C. Wilson, president, A.F.A., will present his annual report. A feature of this session will be an address by Rear Admiral A. H. Van Keuren, Naval Research Laboratories, Washington.

Will Present Medals and Life Memberships

Annual business and awards meeting of the association will be held Thursday morning, and will include the usual reports of officers, election of officials for the ensuing year, and presentation of medals and life memberships to four A.F.A. members for outstanding service to the industry and the association. Individuals picked for the 1944 awards are William G. Reichert, Alfred W. Gregg, Herman E. Alex and John Hill. Biographical sketches of these men will be found on page 105 of this issue. Highlighting the technical phase of the annual business and awards meeting will be the second A.F.A. Foundation Lecture, to be presented by H. W. Gillett, Battelle Memorial Institute, Columbus, O., on the subject, "Cupola Raw Materials."

A broad range of subjects will be covered by the so-called general interest papers. These include such matters as plant and plant equipment, manpower and training, inspection of castings, job evaluation and time study, employment of engineering graduates, and refractories. Discussions on manpower problems will embrace, among other topics, foreman training, women as foremen, the conference room method of training, and the development of foremen for the postwar period. Special war production ses-

Congress Time Table

Monday, April 24

6:00-10:00 p.m.—Buffalo Preview Night

Tuesday, April 25

10:00 a.m.— Opening Meeting
11:30 a.m.— War Production Manpower Session
12:30 p.m.—(A) Engineering School Alumni Luncheon
2:00 p.m.—(A) Aluminum and Magnesium
(B) Malleable Gating and Heading Symposium (Session 1)
(C) Plant and Plant Equipment
(D) Refractories
4:00 p.m.—(A) Heading and Gating (Session 1)
(B) Solidification and Heat Transfer
6:00 p.m.— Foreman Training Dinner
8:00 p.m.—(A) Gray Iron Shop Course (Session 1)
(B) Sand Shop Course (Session 1)
(C) Foreman Training

Wednesday, April 26

9:30 a.m.—(A) Brass and Bronze
(B) Malleable Gating and Heading Symposium (Session 2)
(C) Gray Iron Castings
(D) Sand Research
11:00 a.m.— War Production Division Luncheon
12:30 p.m.—(A) Malleable Division Luncheon
(B) Canadian Members Luncheon
2:00 p.m.—(A) Aluminum and Magnesium
(B) Steel Foundry Sands
(C) Gray Iron Castings
(D) Inspection of Castings
3:00 p.m.— Malleable Castings
4:00 p.m.—(A) Heading and Gating (Session 2)
(B) Brass and Bronze
(C) Chapter Delegate Meeting
6:00 p.m.— Chapter Officers Dinner
6:30 p.m.— Foundry Instructors Dinner
8:00 p.m.—(A) Gray Iron Shop Course (Session 2)
(B) Sand Shop Course (Session 2)
(C) Analytical Methods for Cast Metals
(D) Engineers in the Foundry

Thursday, April 27

9:30 a.m.— Annual Business and Awards Meeting
12:30 p.m.— Brass, Bronze Round Table Luncheon
2:00 p.m.—(A) Aluminum and Magnesium
(B) Steel Castings
(C) Gray Iron Castings
(D) Safety and Hygiene
4:00 p.m.—(A) Heading and Gating (Session 3)
(B) Centrifugal Casting Symposium—Nonferrous (Session 1)
(C) Steel Castings
8:00 p.m.—(A) Job Evaluation and Time Study
(B) Gray Iron Shop Course (Session 3)
(C) Sand Shop Course (Session 3)

Friday, April 23

9:30 a.m.—(A) Steel Castings
(B) Patternmaking
(C) Heading and Gating (Session 4)
12:30 p.m.— Steel Division Round Table Luncheon
2:00 p.m.—(A) Foundry Costs
(B) Gray Iron Shop Course (Session 4)
3:00 p.m.— Centrifugal Casting Symposium—Steel (Session 2)
7:00 p.m.— Annual Dinner

sions also will take up various questions relating to manpower problems, including that of postwar apprenticeships.

Centrifugal casting will receive more than usual attention at the congress. Seven papers on this subject are scheduled, and will cover not only problems and methods of production, but also the engineering principles involved in construction of centrifugal casting machines. Production of precision castings by the investment molding process will be described in one paper.

The Gray Iron Division will sponsor sessions at which molding, melting and processing procedures will be considered. Subjects to be covered include ladle treatment of cast iron; factors in superheating and its effects; some phases of cupola operation and properties of gray cast iron; a study of molding methods to produce sound castings; molding steam cylinders for marine engines, and methods of preparing cast iron for subsequent processing. A gray iron shop course will cover welding, chill tests and foundry coke.

Outstanding in the Malleable Iron Division program will be a symposium of nine papers dealing with heading and gating. Other papers will consider malleable mixture calculations and melting control; pulverized coal firing of melting and annealing furnaces; heat flow problems; coin pressing malleable castings, and physical properties developed by isothermal quenching of malleable iron.

Cover Many Practices and Problems

Subjects to be covered in papers scheduled by the Aluminum and Magnesium Division include the effect of alloying elements; the cold-chamber die casting process; controlled directional solidification in plaster molds; determination of permeability of plaster molds; the need for better quality aircraft castings, and micro-radiography as a foundry tool. The annual exchange paper from the Institute of British Foundrymen, prepared by John Vickers, Rolls-Royce Ltd., England, will discuss permanent mold castings.

Discussions on steel foundry subjects will comprise a large number of papers. These are grouped in four general types: Steel foundry sands; hardenability and heat treatment; physical properties of steel castings; and non-destructive testing methods. Three papers are scheduled on hardenability problems. Progress reports will be presented by committees on heat treatment of steel castings and on methods of producing steel for castings. Five papers are scheduled for the session covering non-destructive testing methods.

The round-table luncheon of the Brass and Bronze Division will be followed by five papers discussing melting in various types of furnaces. At another session the utilization of cartridge brass will be described.

Additional details on paper subjects and authors will be found in the tentative program listed on pages 106 and 107 of this issue.

A.F.A. Awards honor four Foundrymen

ALFRED W. GREGG

WILLIAM G. REICHERT

JOHN HILL

HERMAN E. ALEX

RECOGNITION accorded annually by the American Foundrymen's Association to individuals for outstanding contributions to advancement of the foundry industry, will be given to four men during the 48th annual convention and War Production Foundry Congress in Buffalo. Two gold medals and two life memberships in the A.F.A. comprise the 1944 awards, which will be presented during the association's annual business and awards meeting Thursday morning, April 27.

William G. Reichert, president, the W. G. Reichert Engineering Co., Newark, N. J., will receive the Joseph S. Seaman Gold Medal "in recognition of his outstanding service to the foundry industry and the association, especially for his work in the educational and research fields of foundry sand and its control."

Alfred W. Gregg, executive engineer, the Whiting Corp., Harvey, Ill., will be awarded the J. H. Whiting Gold Medal "in recognition of his outstanding contributions to the foundry industry and the association, especially for his work in the development of steel melting practices."

Herman E. Alex, for many years in charge of the foundry of the Rock Island Arsenal, Rock Island, Ill., and John Hill, president, the Hill & Griffith Co., Cincinnati, will be presented life memberships in the A.F.A. for their long and continuous efforts in behalf of the industry and the association.

William G. Reichert was born in Elizabeth, N. J., and was graduated from Polytechnic Institute of Brooklyn in chemical engineering. He began his foundry career with the Singer Mfg. Co. at Elizabeth in 1918, first as chemist, later as engineer of tests, and finally as metallurgical engineer. He remained with that company until 1939 when he became general foundry metallurgist for all divisions of the American Brake Shoe Co. with headquarters at Mahwah, N. J. His work in that capacity included metallurgical control of the foundries of not only the parent company, but also those of the American Manganese Steel, Southern Wheel and the National Bearing Metals Divisions—over 40 foundries in all. A year ago, he resigned to form his own company, specializing in mechanization and improvement of foundry operations.

Mr. Reichert has been active in association committee work for many years, particularly with the Foundry Sand Research Committee. Among other national committees on which he has served are the Gray Iron Division Committee on Analysis of Defects, and the Cupola Research Subcommittee on Pig Iron and Subcommittee on Scrap. He has prepared numerous papers dealing with foundry sand, and is the author of a book to be published soon by the A.F.A., entitled "Molding Sand Practice and Control." In 1935, he presented the annual exchange paper to the Institute of British Foundrymen. In addition to his active participation in national committee work, Mr. Reichert has served as a director of the Metropolitan Chapter.

Alfred W. Gregg is a native of Illinois, and received his education at the public schools of Chicago and at Purdue University, Lafayette, Ind. He was graduated from the latter with a B.S. degree in 1903 and received an M.S. degree in 1904. His industrial career has included associations with the (*Please turn to page* 234)

TENTATIVE for the War Foundry

Monday, April 24

6:00-10:00 p.m.—Buffalo Preview Night.

All exhibits of the Foundry Show at Buffalo Memorial Auditorium will be open.

Tuesday, April 25

10:00 a.m.—Opening Session.

Presiding, Lee C. Wilson, president, A.F.A. Vice-chairman, Ralph J. Teetor, vice president, A.F.A.
Welcome—Frank E. Bates, chairman, Western New York Chapter, A.F.A.
President's Annual Address.
Address by Rear Admiral A. H. Van Keuren, Naval Research Laboratories, Washington.

11:30 a.m.—War Production Manpower Session.

Presiding—Lee C. Wilson, president A.F.A. Co-chairman—Ralph J. Teetor, vice president, A.F.A.
Speaker: H. S. Colby, consultant to deputy vice-chairman for production, War Production Board, Washington.

12:30 p.m.—Engineering School Alumni Luncheons.

2:00 p.m.—Aluminum and Magnesium.

Effect of Alloying Elements in Aluminum Casting Alloys, by Walter Bonsack, National Smelting Co., Cleveland.
Natural Aging of Aluminum-Zinc-Magnesium, by Hiram Brown, Frontier Bronze Corp., Niagara Falls, N. Y.
Micro-radiography as a Tool in Foundry Control, by L. W. Ball, Triplett & Barton Inc., Burbank, Calif.

2:00 p.m.—Malleable Iron Symposium on Gating and Risering. (1st Session).

Gating and Feeding Malleable Pipe Fittings, by M. L. Hawkins, Stockham Pipe Fittings Co., Birmingham, Ala.
Pattern Planning for Malleable Production, by E. F. Waterbor, Michigan Malleable Iron Co., Detroit.
Gating and Heading Malleable Castings, by C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill.

2:00 p.m.—Plant and Plant Equipment.

Some Practical and Economic Aspects of Small Foundry Conveyorization, by H. B. Nye, New York Air Brake Co., Watertown, N. Y.
Maintenance and Foundry Equipment, by Frank J. Dost, Sterling Foundry Co., Wellington, O.

2:00 p.m.—Refractories.

High Temperature of Heat Insulation, by G. W. Paterson, Canadian Refractories, Ltd., Montreal, P.Q., Canada.
Drying of Foundry Ladles, by Cecil E. Bales and Francis McCarthy, Ironton Firebrick Co., Ironton, O.
Pouring Green Sand Steel Molds with the "Baby" Bottom Pour, by S. E. McGinty, Firegan Sales Co., Chicago.

4:00 p.m.—Heading and Gating Lecture Course (Session 1)

Subject: Gray Iron.
Discussion leader: W. W. Levi, Lynchburg Foundry Co., Radford, Va.

4:00 p.m.—Solidification and Heat Transfer.

Introductory Observations on the Rate of Solidification of Malleable Iron, by B. C. Yearley, R. P. Schauss and P. A. Martin, National Malleable & Steel Castings Co., Cicero, Ill.
Heat Flow Problems in Foundry Work—Survey Method of Solution and Example, by Dr. V. Paschkis, Columbia University, New York.
Directionally Controlled Rapid Thermal Dissipation To Obtain Progressive Solidification, by Henry Hagemeyer, Castings Patent Corp., Chicago.

6:00 p.m.—Foreman Training Dinner.

8:00 p.m.—Gray Iron Shop Course (Session 1).

Subject: The Chill Test as a Foundry Control Tool.
Discusssion—Members of Gray Iron Division Chill Test Committee.
(a) Introduction.
(b) Types of Chill Tests.
(c) Dry vs. Green Sand Molds.
(d) Effects of Pouring Temperature.
(e) Correlation of Test Data.

8:00 p.m.—Sand Shop Course (Session 1).

Subject: Dry Core Binders.
Discussion leader: W. C. Morgan, E. F. Houghton Co., Detroit.

8:00 p.m.—Foreman Training.

Training of Foremen on the Job, by F. K. Dossett, Thompson Aircraft Products Co., Cleveland.
Training Foremen to Handle Women, by W. J. Hebard, Continental Roll & Steel Foundry Co., East Chicago, Ind. (To be presented by F. E. Wartgow, American Steel Foundries, Chicago.)
Women as Foremen, by S. M. Brah, Rustless Iron & Steel Corp., Baltimore.
The Post-War Foreman, by T. H. Booth, Walworth Co., Washington Park, Ill.
Training Foremen Through the Conference Room Method, by Steven G. Garry, Caterpillar Tractor Co., Peoria, Ill.

Wednesday, April 26

9:30 a.m.—Brass and Bronze.

Melting Nonferrous Metals in the Cupola, by Leighton M. Long, Battelle Memorial Institute, Columbus, O.
Some Causes of Test Bar Failure in Navy G and M Metals, by W. B. George, R. Lavin & Sons, Chicago.

9:30 a.m.—Malleable Iron Symposium on Gating and Risering (2nd Session).

Heading and Gating of Malleable Iron Castings, by A. S. Klimok, Albion Malleable Iron Co., Albion, Mich.
Gating and Risering Practice for Heavy Malleable Castings, by D. I. Dobson, General Malleable Corp., Waukesha, Wis.
Gating and Heading Malleable Castings, by A. T. Jeffery, Dayton Malleable Iron Co., Dayton, O.

9:30 a.m.—Gray Iron Castings.

Molding Gray Iron Cylinders by the Four-Part Cheek Method, by Robert Hendry, Beloit Iron Works, Beloit, Wis.
A Study of Molding Methods for Sound Castings, by Fred G. Sefing, International Nickel Co., New York.

9:30 a.m.—Foundry Sand Developments.

Progress Report on Investigation of Elevated Temperature Properties of Steel Foundry Sands, by D. C. Williams, Cornell University, Ithaca, N. Y.
Hot Permeability of Molding Materials, by Harry W. Dietert, Harry W. Dietert Co., Detroit.

11:00 a.m.—War Production Manpower Session.

Subject: Postwar Apprenticeship Problems.
Speaker: William F. Patterson, Director, Apprentice Training Service, Washington.

12:30 p.m.—Malleable Round Table Luncheon.

Subject: Current Malleable Foundry Production Problems.
Discussion leaders: Malleable Division Roundtable Conference Committee.

12:30 p.m.—Canadian Members Luncheon.

2:00 p.m.—Aluminum and Magnesium.

Mechanized Production of Gravity Die Castings, by J. Vickers, Rolls-Royce Co., England (Official Exchange Paper of Institute of British Foundrymen).
Apparatus and Method of Measuring Relative Permeability in Dense Mold Materials, by John Neff, U. S. Gypsum Co., Chicago.

2:00 p.m.—Steel Foundry Sands.

Cumulative Curve in Foundry Sand Control, by R. E. Morey and Howard F. Taylor, Naval Research Laboratories, Washington.
Operating Properties of Steel Foundry Sands, by Harry W. Dietert, Harry W. Dietert Co., Detroit.
Reproducibility of Elevated Temperature Sand Test Results, by John A. Rassenfoss, American Steel Foundries, East Chicago, Ind.

2:00 p.m.—Gray Iron.

Cupola Operation, by E. E. Marbaker, Mellon Institute, Pittsburgh.
Engineering Properties of Gray Cast Iron, by R. G. McElwee, Vanadium Corp. of America, Detroit.

2:00 p.m.—Inspection of Castings.

Consumers' Viewpoint on Castings, by L. A. Danse, General Motors Corp., Detroit.
Some Aspects of Casting Inspection as Seen by a Purchasing Agent, by R. V. Elms, Sperry Gyroscope Co., Inc., Brooklyn, N. Y.
Navy Inspection Standards, by Clyde L. Frear, Bureau of Ships, U. S. Navy, Washington.
Summarizer—E. F. Platt, Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

3:00 p.m.—Malleable Iron Founding.

Pulverized Coal Firing of Malleable Iron Annealing and Melting Furnaces, by D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., and L. E. Wilcoxson, Babcock & Wilcox Co., Barberton, O.
Malleable Mixture Calculation and Melting Control, by M. E. McKinney, International Harvester Co., Ltd., Hamilton, Ont.
A Metallographic Quality Test for Malleable Iron, by C. T. Eakin and H. W. Lownie, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Coin Pressing of Malleable Castings, by C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill.
Rate of Spheroidization and Physical Properties of Pearlitic Malleable Iron after Isothermal Quenching, by W. H. Bruckner and J. Hino, University of Illinois, Urbana, Ill.

4:00 p.m.—Heading and Gating Course (Session 2).

Subject: Steel.
Discussion leader: Howard Taylor, Naval Research Laboratory, Washington.

PROGRAM

Production Congress

4:00 p.m.—Brass and Bronze.
Effect of Temperature, Water Vapor and Carbon Reactions in Brass and Bronze Melting Furnaces, by H. L. Smith, Federated Metals Division, American Smelting & Refining Co., Barber, N. J.
The Utilization of Cartridge Brass, by Dr. B. M. Loring, Naval Research Laboratories, Washington.

4:00 p.m.—Chapter Delegate Meeting.

6:00 p.m.—Chapter Officers Dinner.

6:30 p.m.—Foundry Instructors' Dinner.

8:00 p.m.—Gray Iron Shop Course (Session 2).
Subject: Inoculating Alloys and Effects on Chill Control.
Discussion leader: Tom E. Barlow, Battelle Memorial Institute, Columbus, O.

8:00 p.m.—Sand Shop Course (Session 2).
Subject: Sand Problems.
Discussion leader: Earl E. Woodliff, Sand Service Engineering Co., Detroit.

8:00 p.m.—Analytical Methods for Cast Metals.
Selection of Spectrographic Equipment for the Foundry, by Harry W. Dietert and John Schuch, Harry W. Dietert Co., Detroit.
Spectrographic Analysis of Iron and Steel, by H. F. Kincaid, International Harvester Co., Rock Island, Ill.
A Combined Method of Analysis for Unalloyed and Alloyed Iron and Steel, by W. B. Sobers, Chain Belt Co., Milwaukee.

8:00 p.m.—Engineers in the Foundry.
Engineers in the Foundry, by L. J. Fletcher, Caterpiller Tractor Co., Peoria, Ill.
Employment of Technical Graduates in the Foundry Industry, by C. L. Heater, American Steel Foundries, Chicago.

Thursday, April 27

9:30 a.m.—Annual Business and Awards Meeting.
Presiding, Lee C. Wilson, president, A.F.A. Vice-chairman, Ralph J. Teetor, vice president, A.F.A.
Report of Officers.
Report of Election of Officers.
Medal and Life Membership Awards.
A.F.A. Foundation Lecture—*Cupola Raw Materials*, by H. W. Gillett, Battelle Memorial Institute, Columbus, O.

12:30 p.m.—Brass and Bronze Round Table Luncheon.
Subject: Brass and Bronze Melting.
Melting in Crucible Furnace, by Fred L. Wolf, Ross-Tacony Crucible Co., Philadelphia.
Melting Nonferrous Metals in Cupola Furnace, by Leighton M. Long, Battelle Memorial Institute, Columbus, O.
Melting in the Arc-type Electric Furnace, by Harry M. St. John, Crane Co., Chicago.
Melting in Low Frequency Induction Furnace, by Henry Gieseke, Ajax Metal Co., Philadelphia.
Melting in High Frequency Induction Furnace, by Frank T. Chestnut, Ajax Metal Co., Philadelphia.
Summarization, by R. W. Parsons, Ohio Brass Co., Mansfield, O.

2:00 p.m.—Aluminum and Magnesium.
Die Casting of Aluminum Alloys by the Cold Chamber Process, by S. U. Siena, Sperry Gyroscope Co., Brooklyn, N. Y.
Need for Better Quality Aircraft Castings, by R. E. Ward, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.

2:00 p.m.—Hardenability and Heat Treatment of Steel Castings.
Hardenability of Some Cast Steels, by J. B. Caine, Sawbrook Steel Castings Co., Lockland, Cincinnati.
Hardenability and the Steel Castings, by K. L. Clark and J. H. Richards, Naval Research Laboratory, Washington.
Effect of Copper in Some NE and Low-Alloy Cast Steels, by C. T. Greenidge, M. C. Udy, and K. Grube, Battelle Memorial Institute, Columbus, O.
Problems Encountered in Making and Heat Treating Castings of an Air Hardening Steel, by Gordon W. Johnson, American Hoist & Derrick Co., St. Paul.
Progress Report of Committee on Heat Treatment of Steel Castings, by E. R. Young, Climax Molybdenum Co., Chicago.

2:00 p.m.—Gray Iron Foundry Practice.
Alterations in Cast Iron Properties Accompanying the Use of a Strong Inoculant of the Silicon-Manganese-Zirconium Type, by C. O. Burgess, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y.
Factors Involved in Superheating Gray Cast Iron and Their Effects on Structure and Properties, by A. W. Schneble, Advance Foundry Co., Dayton, O.
Preparing Cast Iron for Subsequent Processing, by J. H. Shoemaker, Kolene Corp., Detroit.
Investigation of Graphite Formation, by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

2:00 p.m.—Safety and Hygiene.

4:00 p.m.—Heading and Gating. Lecture Course (Session 3).
Subject: Aluminum and Magnesium.
Discussion leader: R. E. Ward, Eclipse-Pioneer Division, Bendix Aviation Corp., Bendix, N. J.

4:00 p.m.—Centrifugal Casting Symposium (Session 1).
Beneficial Effect of Centrifugal Casting upon Heavy Nonferrous Alloys, by W. W. Edens, Ampco Metal, Inc., Milwaukee.
Centrifugal Casting of Nonferrous Metals, by I. E. Cox, National Bearing Metals Co., St. Louis.
Accurate Castings by the Investment Molding Process, by Robert Neiman, Whip-Mix Corp., Louisville, Ky.
Calculations and Devices Involved in the Operation of Small Centrifugal Casting Machines, by Jack Weber, Ampco Metal, Inc., Milwaukee.

4:00 p.m.—Properties of Steel Castings.
Properties and Advantages of Low-alloy, Low-carbon, Copper Bearing Cast Steels, by Howard F. Taylor and H. F. Bishop, Naval Research Laboratory, Washington.
Low Carbon Steel for Castings, by C. J. Lutts and J. P. Hickey, U. S. Navy Yard, Boston.
Notes on Recent Steel Casting Developments, by S. W. Brinson and J. A. Duma, Norfolk Navy Yard, Portsmouth, Va.
Test Bar Molds for Steel Castings, by H. F. Bishop and R. C. Wayne, Naval Research Laboratory, Washington.
Report of Committee on Methods of Producing Steel for Castings, by C. E. Sims, Battelle Memorial Institute, Columbus, O.

8:00 p.m.—Job Evaluation and Time Study.
Job Evaluation and Time Study Principles as Approved by W.P.B., by John W. Nickerson, director, Management Consultant Division, War Production Board, Washington.
Standards in Times of Emergency, by Phil Carroll, Maplewood, N. J. (Presented by F. E. Wartgow for discussion).
Job Evaluation, General discussion by committee.

8:00 p.m.—Gray Iron Shop Course (Session 3).
Subject: Foundry Coke—A Critical Study.
Discussion Leader—B. P. Mulcahy, Citizens' Gas & Coke Utility, Indianapolis.

8:00 p.m.—Sand Shop Course (Session 3).
Subject: Application of Mold Protection.
Discussion leader: Joseph A. Gitzen, Delta Oil Products Co., Milwaukee.

Friday, April 28th

9:30 a.m.—Non-Destructive Testing of Steel Castings.
Conditioning of Steel Castings to Standards of Quality, by Paul Ffield, Bethlehem Steel Co., Bethlehem, Pa.
Magnetic Powder Inspection of Large Castings, by John Cotton, Bethlehem Steel Co., Steelton, Pa.
Report of Committee on Non-destructive Testing, by C. W. Briggs, Steel Founders Society of America, Cleveland.
Effect of Copper on the Properties of Cast Carbon-Molybdenum Steels, by N. A. Ziegler and W. L. Meinhart, Crane Co., Chicago.
Brazil Produces Steel Castings to Replace Forgings and Fabricated Parts, by H. Zimnawoda, Sao Paulo, Brazil.

9:30 a.m.—Patternmaking.
Use of Gypsum Cements in Pattern and Model Making, by E. H. Schleede, U. S. Gypsum Co., Chicago.
Co-operation between Foundrymen and Patternmakers, by L. F. Tucker, City Pattern Works, South Bend, Ind.

9:30 a.m.—Heading and Gating Lecture Course (Session 4).
Subject: Brass and Bronze.
Discussion leader: W. B. George, R. Lavin & Sons Co., Chicago.

12:30 p.m.—Steel Division Roundtable Luncheon.
Subject: General Discussion.
Leaders: John Howe Hall, General Steel Castings Co., Eddystone, Pa., G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind., and A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn.

2:00 p.m.—Foundry Costs.
Subject: Renegotiation in the Foundry.
Speaker: Major Stephen B. Ives, chief, Financial Analysis Section of the Renegotiation Division, Army Service Forces, Washington.

2:00 p.m.—Gray Iron Shop Course (Session 4).
Subject: Welding Cast Iron.
Discussion leader: F. J. Walls, International Nickel Co. Inc., Detroit.

3:00 p.m.—Centrifugal Casting Symposium-Steel (Session 2).
Centrifugal Castings, by Peter Blackwood and John Perkins, Ford Motor Co. of Canada, Ltd., Windsor, Ont.
Centrifugal Casting of Steel, by C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala.
Effect of Spinning Speeds on Centrifugal Castings, by F. G. Carrington, Lynchburg Foundry Co., Lynchburg, Va.

7:00 p.m.—Annual Dinner.
Presiding, Lee C. Wilson, president, A.F.A. Vice-chairman, Ralph J. Teetor, vice president, A.F.A.

List of Exhibitors

(Corrected to March 17)

A

Adams Co.
Air Reduction Sales Co.
Ajax Electrothermic Corp.
Ajax Engineering Corp.
Ajax Metal Co.
Ajax Flexible Coupling Co.
American Air Filter Co.
American Allsafe Co.
American Crucible Co.
American Foundry Equipment Co.
American Optical Co.
American Photocopy Equipment Co.
American Steel Abrasive Co.
Arcade Mfg. Co.
Asbury Graphite Mills Inc.
Atlas Publishing Co.
Automatic Transportation Co.
Ayers Mineral Co.

B

Baker Perkins Inc.
C. O. Bartlett & Snow Co.
Beardsley & Piper Co.
Black, Sivalls & Bryson, Inc.
Blaw-Knox Co.
Bloomsbury Graphite Co.
Blystone Division, Standard Sand & Machine Co.
Bradley Washfountain Co.
Brickseal Refractory Co.
Briggs Mfg. Co.
Buckeye Products Co.
Adolph I. Buehler
Buell Engineering Co.
Buffalo Forge Co.

C

Campbell-Hausfeld Co.
Canadian Radium & Uranium Corp.
Certified Core Oil & Mfg. Co.
Chain Belt Co.
Champion Foundry & Machine Co.
Chicago Pneumatic Tool Co.
Clearfield Machine Co.
Cleveland Pneumatic Tool Co.
Cleveland Quarries Co.
Climax Molybdenum Co.
L. A. Cohn & Bro., Inc.
L. S. Cohen & Co., Inc.
Columbus McKinnon Chain Corp.
Combined Supply & Equipment Co. Inc.
Conco Eng. Works, Div. H. D. Conkey & Co.
Conover Engineering Co.
Corn Products Sales Co.

D

Davenport Machine & Foundry Co.
Dayton Oil Co.
Delta Products Co.
Wm. Demmler & Bros.
Despatch Oven Co.
Detroit Electric Furnace Division, Kuhlman Electric Co.
De Walt Products Corp.
Harry W. Dietert Co.
Joseph Dixon Crucible Co.
Dougherty Lumber Co.
Allen B. Du Mont Laboratories, Inc.
Duquesne Smelting Corp.

E

Eastern Clay Products, Inc.
Eastman Kodak Co.
Electro Metallurgical Co.
Electro Refractories & Alloys Corp.
Elwell-Parker Electric Co.
Engineering Sales Co.
Eutectic Welding Alloys, Inc.

F

Federal Foundry Supply Co.
Federated Metals Division, American Smelting & Refining Co.
Fisher Furnace Co.
The Foundry
Foundry Equipment Co.
Fox Grinders Inc.
Foxboro Co.
Freeman Supply Co.
Fremont Flask Co.
Frontier Bronze Corp.

G

Gamma Instrument Co.
General Electric X-Ray Corp.
Globe Steel Abrasive Co.
Great Lakes Foundry Sand Co.
Great Western Mfg. Co.
Samuel Greenfield Co.

H

Hanna Furnace Corp.
Benjamin Harris & Co.
Hercules Powder Co.
Herman Pneumatic Machine Co.
Hickman, Williams & Co.
Hill & Griffith Co.

LATEST developments in the equipment and supplies which have played such an important part in the tremendous expansion of castings production for war purposes will be portrayed at the Foundry Show to be held in conjunction with the American Foundrymen's Association's War Production Foundry Congress at Buffalo, April 25-28. More than 225 companies will conduct exhibits in Buffalo's modern and spacious Memorial Auditorium to make it the largest show since the 1930 event in Cleveland.

Recent intense growth in foundry production facilities, resulting in accumulation of considerable operating data on latest types of equipment, lends added practical value to this 1944 show.

Although the congress proper starts Tuesday morning, April 25, all exhibits of the Foundry Show will be open Monday evening from 6 to 10 p.m. for a "Buffalo Preview." This preview will give plant men of the Buffalo area an opportunity to inspect the exhibits, and, as in past years, is expected to draw heavily from those who will be unable to attend during the ensuing four days when the show will be open from 9 a.m. until 5:30 p.m. Admission to the preview will be free, on presentation of tickets which will be distributed by members of the Western New York and Rochester Chapters of the A.F.A. through the management of individual firms.

Hines Flask Co.
Hoffman Foundry Supply Co.
E. F. Houghton & Co.
Hougland & Hardy, Inc.
Hudson Foundry & Machine Co.
Hydro-Blast Corp.

I

Illinois Clay Products Co.
Illinois Testing Laboratories, Inc.
Independent Pneumatic Tool Co.
Industrial Minerals Co.
Ingersoll-Rand Co.
Insto-Gas Corp.
International Graphite & Electrode Corp.
International Molding Machine Co.
International Nickel Co.
Ironton Fire Brick Co.

J

Jackson & Church Co.
Jeffrey Mfg. Co.
Johnston & Jennings Co.

K

Kindt-Collins Co.
Kolene Corp.
H. Kramer & Co.

L

Lancaster Iron Works, Inc.
Lava Crucible Co. of Pittsburgh
R. Lavin & Sons, Inc.
Lift Trucks Inc.
Link-Belt Co.

M

J. S. McCormick Co.
Machine Design
Macleod Co.
Paul Maehler Co.
Magnaflux Corp.
R. C. Mahon Co.
Mahr Mfg. Co., Division Diamond Iron Works, Inc.
Mall Tool Co.
Marathon Chemical Co., Division Marathon Paper Mills Co.
Master Tool Co.
Mathews Conveyer Co.
Metallizing Co. of America
Michigan Smelting & Refining Division, Bohn Aluminum & Brass Corp.
Mid-West Abrasive Co.
Milwaukee Foundry Equipment Co.
Mine Safety Appliances Co.
Modern Equipment Co.
Molybdenum Corp. of America
Jas. A. Murphy & Co.

N

Nassau Smelting & Refining Co.
National Carbon Co., Inc., Carbon Products Division
National Engineering Co.
National Gypsum Co.
Newaygo Engineering Co.
New Equipment Digest
New Jersey Silica Sand Co.
Niagara Blower Co.
Niagara Falls Smelting & Refining Corp.
Wm. H. Nicholls Co.
Nichols Engineering & Research Co.
North American Smelting Co.

O

S. Obermayer Co.
Oliver Machinery Co.
Osborn Mfg. Co.

P

Pangborn Corp.
Parsons Engineering Corp.
Peerless Mineral Products Co.
Penn-Rillton Co.
Pennsylvania Foundry Supply & Sand Co.
Penola, Inc.
Penton Publishing Co.
Peters-Dalton, Inc.
Geo. F. Pettinos
Picker X-Ray Corp.
E. W. Pike & Co.
Pittsburgh Crushed Steel Co.
Pittsburgh Lectromelt Furnace Corp.
Pollard Oil Products Co.
Porter-Cable Machine Co.
Powermatic Ventilator Co.
Pyro Clay Products Co.
Pyrometer Instrument Co.

Q

Queen City Sand & Supply Co.

R

Radium Chemical Co.
Ramtite Co., Division S. Obermayer Co.
N. Ransohoff, Inc.
Reinhold Publishing Corp.
Reliable Pattern & Castings Co.
Republic Coal & Coke Co.
Republic Structural Iron Works
Robins Conveyors Inc.
Rotor Tool Co.
Royer Foundry & Machine Co.

S

Safety Engineering
Sand Products Corp.
A. Schrader's Son
Claude B. Schneible Co.
Schramm, Inc.
F. E. Schundler & Co.
Scientific Cast Products Corp.
Semet Solvay Co.
Severance Tool Industries Inc.
Simplicity Engineering Co.
W. W. Sly Mfg. Co.
Smith Facing & Supply Co.
Smith Oil & Refining Co.
Werner G. Smith Co., Division Archer-Daniels-Midland Co.
Spencer Turbine Co.
SPO, Inc.
Springfield Facing Co.
Standard Conveyor Co.
Standard Horse Nail Corp.
Standard Sand & Machine Co.
Steel
Steel Conversion & Supply Co.
Steel Shot and Grit Co.
Steelblast Abrasive Co.
Sterling Wheelbarrow Co.
Frederic B. Stevens, Inc.
Stroman Furnace & Engineering Co.
Swan-Finch Oil Corp.
Syntron Co.

T

Tabor Mfg. Co.
Taggart & Co.
Tamms Silica Co.
Thomas Truck & Caster Co.
Tiona Petroleum Co.
Titanium Alloy Mfg. Co.
Toledo Scale Co.
Tonawanda Iron Corp.
Treat-Nantke Co.
Tubular Micrometer Co.

U

United Compound Co.
United Oil Mfg. Co.
United States Graphite Co.
U. S. Gypsum Co.
U. S. Hoffman Machinery Corp.
U. S. Reduction Co.

V

Vanadium Corp. of America
Vesuvius Crucible Co.

W

Wadsworth Core Machine & Equipment Co.
Western Metal Co.
Wheelco Instruments Co.
Whitehead Brothers Co.
Whiting Corp.
Willson Products, Inc.
E. J. Woodison Co.
Worthington Pump & Machinery Corp.

Y

Yale & Towne Mfg. Co.
Young Bros. Co.

Z

Zanesville Sand Co.

WESTERN NEW YORK

Committee Members

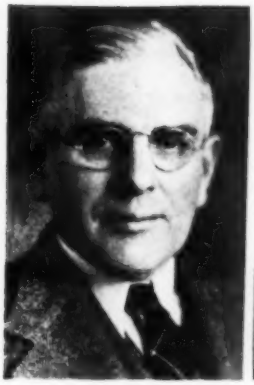
Frank E. Bates

Theodore H. Burke

A. J. Heysel

Leslie C. Thellemann

Henry F. Sproull



Van Loan Whitehead Jr

George Michie

Ralph T. Rycroft

Charles O. Burgess

Milton S. Finley

General Committee

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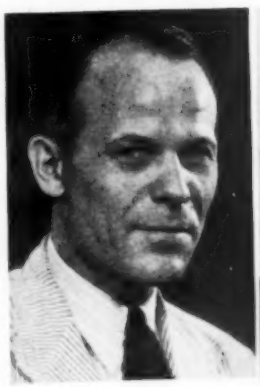

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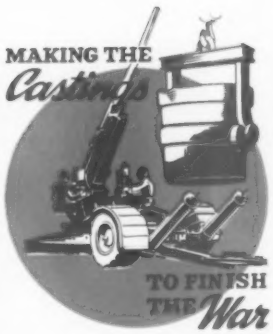

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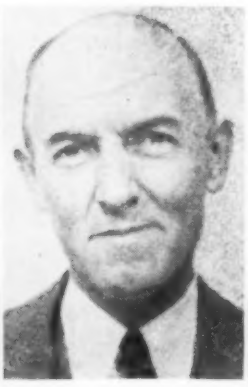

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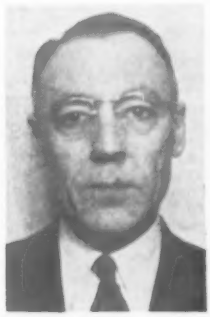

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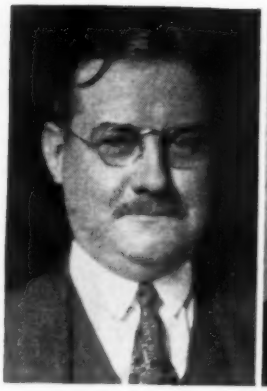

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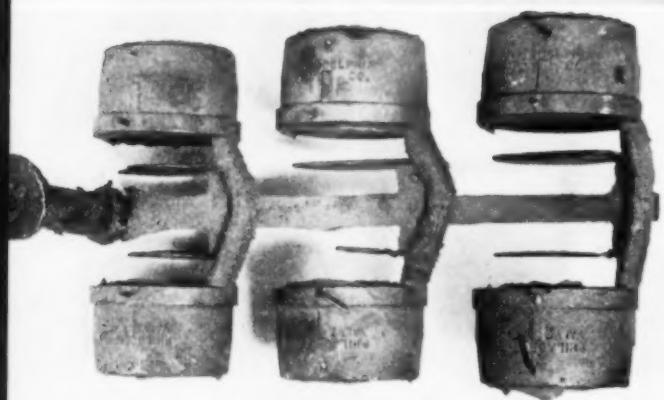
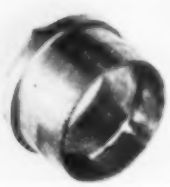
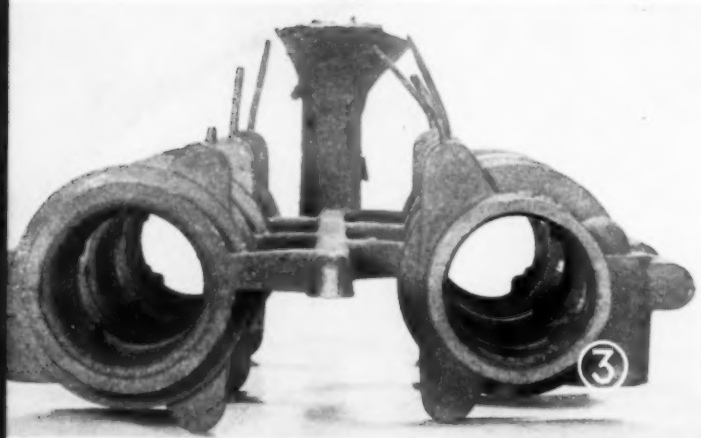
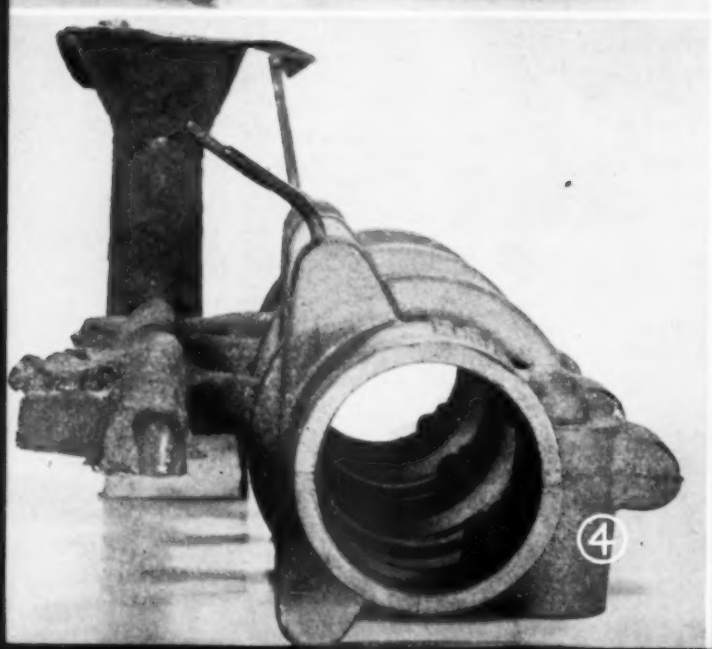
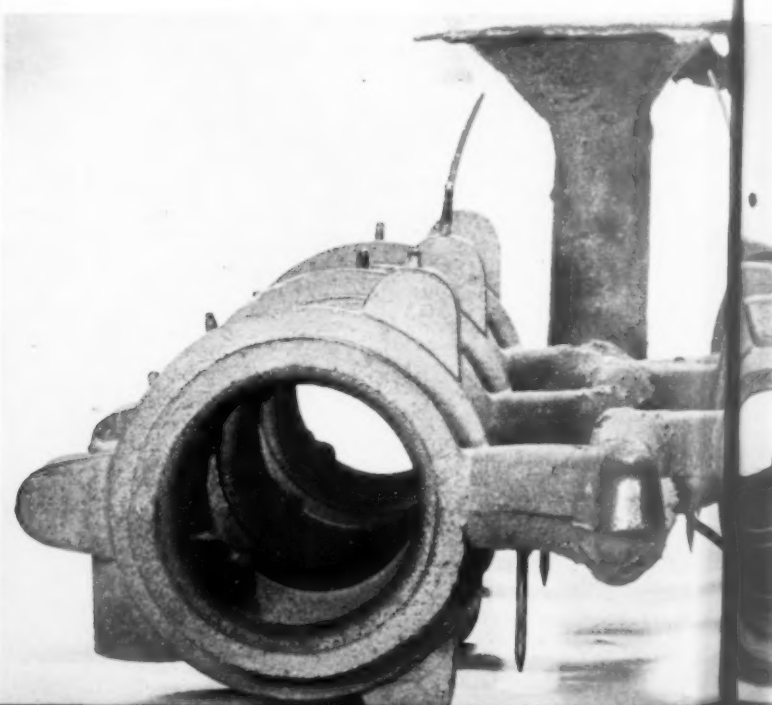










Producing COPPER-ZINC-

By R. J. KEELEY
Metallurgist
Ajax Metal Co., Philadelphia

USE of silicon as a substitute for tin in copper-base alloys has been known for some years, though only of late has the practice been widely publicized and encouraged because of the effort to conserve tin and thus guard against possible shortage of this strategic metal for the duration.

We are all aware of the gravity of the situation which has required conscientious stockpiling of tin in this country. As one prominent foundryman felt impelled to remark, "It would have been a good plan to have stored tin in addition to the gold stored in Kentucky, since tin would have both value and usefulness in the present crisis."

It is worth recalling, then, that the substitution of silicon for tin has practically unlimited possibilities because

Fig. 1—Spray of hose couplings which leaked under pressure test of 90 pounds. Both runners and gates in drag. Fig. 2—Revised gating which produced successful couplings. Gates extend in cope as well as in drag. Fig. 3—End sectional view of spray of faucet ends with runner and gating in cope. Castings leaked under pressure. This is unchanged red brass pattern used for silicon bronze test castings. Fig. 4—Change in runner produced no apparent change in finished castings. Fig. 5—Another end sectional view of spray of faucet end castings of silicon bronze. Castings made on this pattern continued to leak under pressure, until gating was supplemented with oversize risers as shown in Fig. 6

SILICON BRONZE Castings

of the abundance of silicon in nature. As chemistry manuals remind us, compounds of silicon constitute more than one-quarter of the crust of the earth. That is why much research and development work has been performed in the past involving use of silicon in copper-base alloys. A number of silicon bronze alloys are now in use. Some of them are simply copper, silicon, and zinc; others contain, in addition, the elements manganese, iron, aluminum, tin, and other minor constituents.

However, it is the purpose of this discussion to deal principally with the alloys of copper and zinc and having silicon substituted for the tin. Copper-base alloys of the yellow or high brass type containing silicon have been in use for many years, though the silicon-containing alloys with higher copper and lower zinc content were scientifically investigated only within the last decade. This series of alloys came under close scrutiny at about the same time in three parts of the (*Please turn to page* 260)

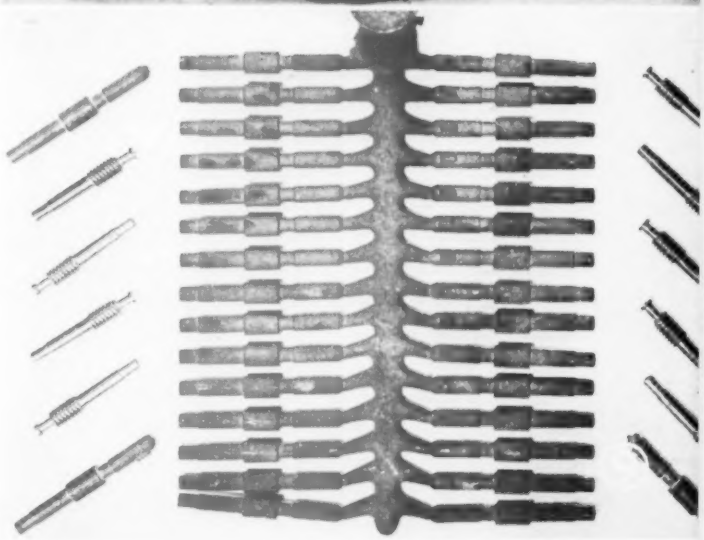


Fig. 6—Showing huge risers used to feed castings described in preceding views, beginning with pattern designed originally for red brass. These risers successfully overcame shrinkage in certain areas of casting. Risers now being reduced to find point at which uncompensated shrinkage develops. Fig. 7—Castings for automatic sprinkler equipment, showing spray of latches as removed from the sand, and finished latch. Fig. 8—Water clapper castings for dry pipe valves, showing gates and runner, as castings come from sand. Castings must stand shop test of 300 pounds pressure. Fig. 9—Valve spindles shown in spray of castings and in rough and finished states. Note angle of gating.

Peace, Colleges and the Making of Castings

PEERING into the future is tricky business. But people like to tamper with tricky things, such as gambling. Whatever the reason, business men talk almost as much about postwar planning as they talk about the war and the winning of it. Planning for peace was taboo at first: "Fool around, mister, with a lot of postwar dreaming and you'll lose the war, that's what you'll do." But people have come around, and now the prevailing viewpoint seems to be that it is just as necessary to prepare for peace in time of war as it is to prepare for war in time of peace; and that neglecting the one job will bring on as bad a mess as neglecting the other.

Charles E. Wilson of the War Production Board insisted as long ago as March, 1942, that "Despite the driving, time-consuming demands of the war program, the conviction is growing that planning for the peace is possible, that it is desirable, and finally that it is imperative."

And many corporations have actually gone to work at it; the Westinghouse Electric & Mfg. Co., for instance. Four key men of the company have racked their brains and labored for months to construct a plan which, says A. W. Robertson, board chairman, should "keep our expanded production capacity occupied after the war, as far as possible, so that we can continue to provide work for the greatly increased numbers of Westinghouse people."

Civilization Will Be More Complex

Should foundrymen plan? Can they plan? What kind of economic world should they expect after the war? There will be revolutionary changes, of course, in business institutions and procedures, and civilization will surely be even more complex than it is now; complex at least, in comparison with war. For war is essentially a simple undertaking. There is one paramount objective, to win the war. The most stupid citizen clearly understands that objective. And because they fear the enemy, even men who hate each other work sweetly together in any kind of war project. But the moment the enemy is defeated and the war is over, all the selfish little minorities will again fight each other for chances to exploit their fellow men.

Liquidation of the enormous war industries will disrupt

By
CLEMENT J. FREUND
Dean, College of Engineering
University of Detroit

"That foundryman is most likely to survive and prosper after the war whose organization is strongest, has the most vitality"

the business world—and the day by day life of the citizens. Chairman Paul G. Hoffman of the Committee for Economic Development tells us that 20,000,000 Americans are directly engaged in the making of war goods. But in 1940 there were only 46,000,000 gainfully employed all told, and from 6,000,000 to 9,000,000 were unemployed. He says that we must find work for 58,000,000 after the war. If we don't, we shall have our hands full of disturbance, to put it mildly. To build up a prewar employment of 46,000,000 to a postwar employment of 58,000,000, while disbanding 20,000,000 war workers and 10,000,000 service men, will be a truly stupendous undertaking.

It must be assumed, I think, that there will be no serious unemployment. The American public will no longer put up with that sort of thing. Private enterprise will have the opportunity to put the people to work—and to keep them working. If private enterprise can't do it, the government will take over, and probably for good.

Harold G. Moulton of the Brookings Institution thinks that the immediate postwar business outlook "on the whole, is somewhat less favorable than that of 1919. While the accumulated shortages and deferred demands will assure for numerous lines of industry great activity in the immediate postwar period, other lines are likely to be confronted with serious difficulties—because of reconversion costs, shortages of working capital, and precarious margins of profit."

Anticipate Maximum Purchasing Power

And according to Wayne C. Taylor, Under Secretary of Commerce, "we can reasonably anticipate: Maximum purchasing power represented by savings in the form of bonds, and reduction of existing individual indebtedness; maximum accumulated demand for all kinds of civilian durable goods, luxury articles and services; maximum requirements for civilian supplies for the populations of the devastated areas; and similar demands for the materials necessary for more permanent construction; . . ."

So much for the over-all postwar situation. What can the average foundryman look for in his immediate front yard? He will have to adjust his business, an old and traditional craft, to upstart industries in electronics, aircraft, plastics and light metals. That will not be easy. Only the smart foundryman will get it done. And the average foundryman can hazard a guess that competition will be fierce. I imagine that only the shrewdest, the wisest and the most experienced will live through it. After all, anybody can be a foundryman today who knows how to melt metal and to make and deliver sound castings. But it will take much more than that to stay in business after the war when the volume of armament trade will be negligible.

But all these opinions and viewpoints are nothing but fragments; none of them will help the foundryman very much, nor all of them together. What he wants is to see a single, clear and complete picture of the whole postwar situation. He wants to know just how and when his war contracts will be adjusted, just how he can finance the rebuilding of his plant, just how severe his tax burden will be, whether the government will intensify or relax its domination of his affairs, whether his labor difficulties will be easier or tougher, what tonnage he can expect to produce and in what kind of metal and so on.

There is nobody who can answer all these questions, there is nobody who can paint the whole picture. And so the foundryman may be tempted to say, "As long as there isn't anybody who can foretell the future, I'm not going to do anything about it. I'll cross my bridges when I get to them." I think that would be a mistake and a bad one. When the future looks particularly perplexing and confused, the smart operator does not even try to lay out his work in detail; he gets organized around basic laws or principles which are obviously right, always have been and always will be. Such a rule or principle in this case is the following:

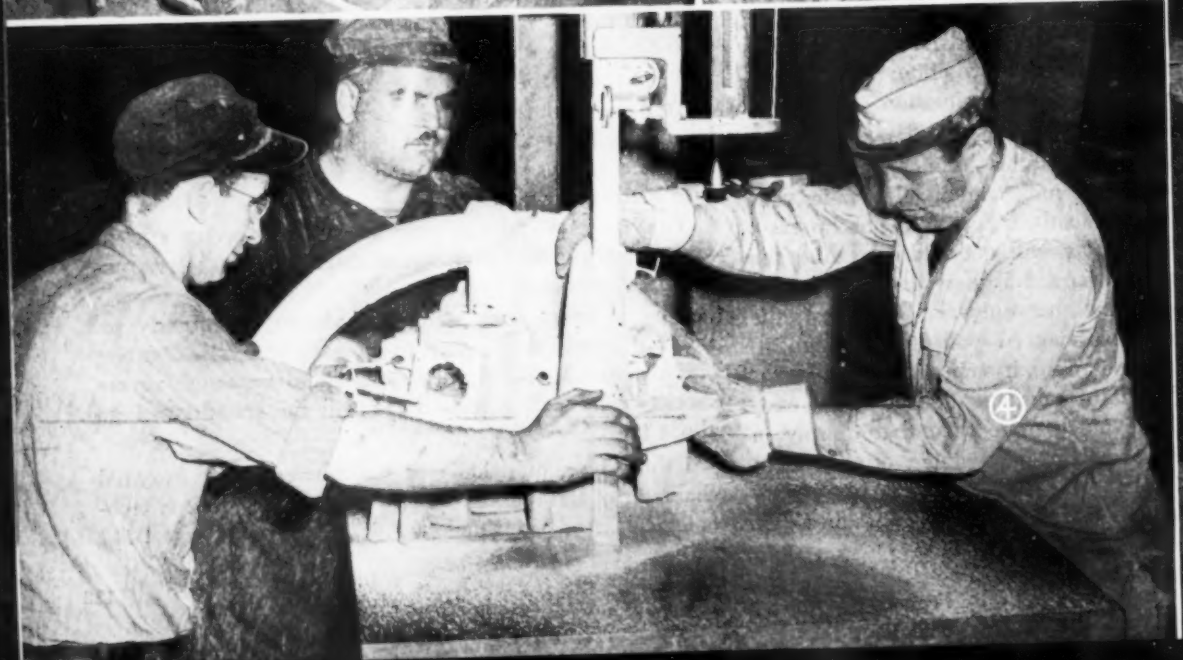
THAT FOUNDRYMAN IS MOST LIKELY TO SURVIVE AND TO PROSPER AFTER THE WAR WHOSE ORGANIZATION IS STRONGEST, HAS THE MOST VITALITY.

That is an obvious statement, almost ridiculously so. But not nearly so obvious is how to build that strong organization, the kind which can stand up under severe shocks and rough going. How will the foundryman go about it?

I think he should look for the answer in the essential character of the foundry craft. The foundry craft is technological. And a technology (*Please turn to page* 244)

Produces

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY



Magnesium Castings

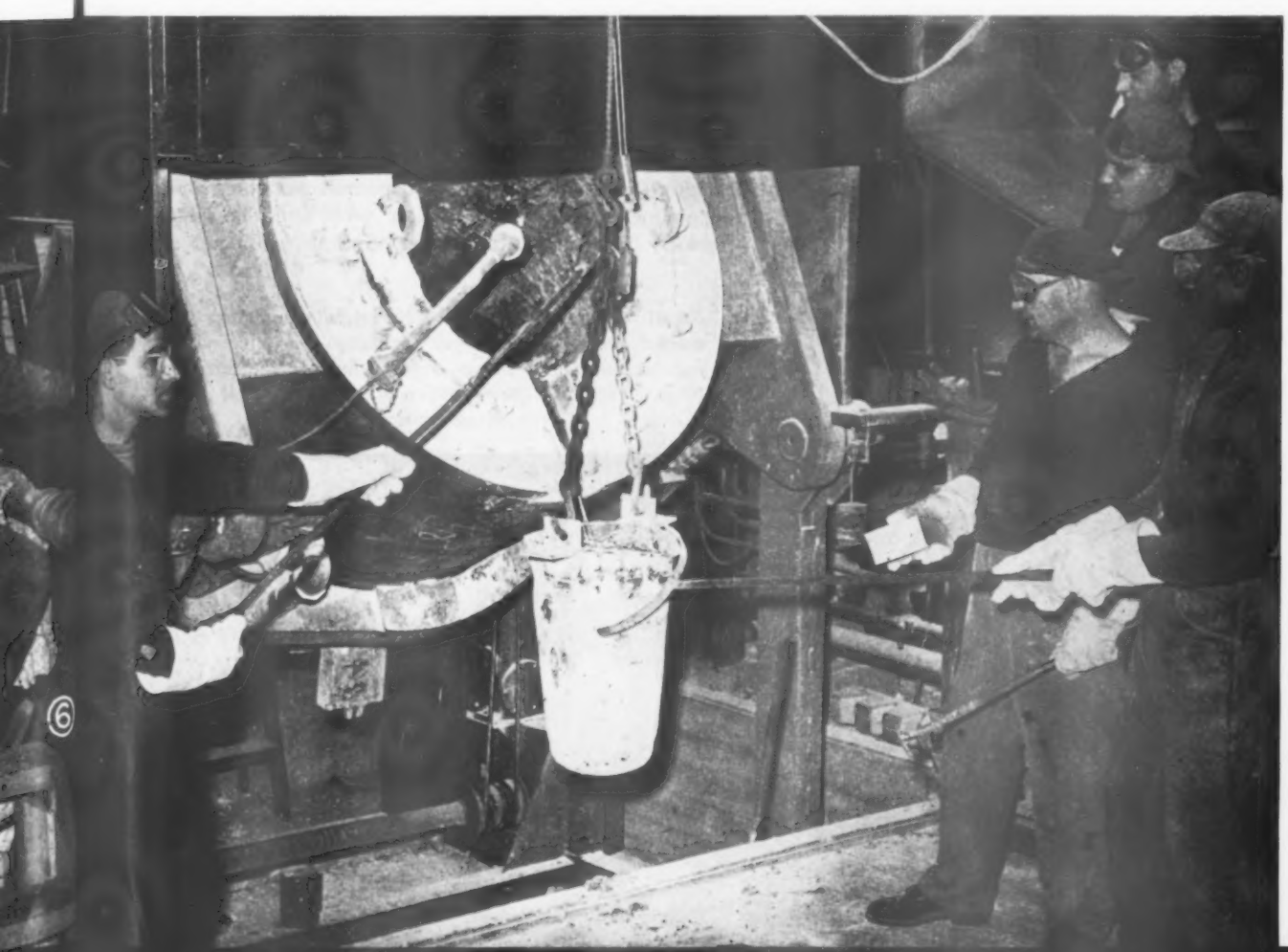
This is the first of two articles describing various features in production of magnesium alloy castings, principally for aircraft application, at the Utica Radiator Corp., Utica, N. Y. Detailed information is presented on melting procedure as well as data on molding and core sands.

EARLY in 1942, with the demand for its products at a low ebb and future prospects none too encouraging as a result of war restrictions, the Utica Radiator Corp., Utica, N. Y., producer of gray cast iron steam and water radiators and allied heating accessories, realized that if it was to be of assistance to the war effort, the plant must be converted to some other type of work. Since its experience was in producing castings, the conversion preferably should not involve a change in field, but rather a change in the branch of the foundry industry. After a careful consideration of all the factors entering into the problem of conversion, it was decided that production of magnesium alloy castings offered excellent possibilities.

Therefore, application was made to WPB for approval of plans for conversion of its gray iron foundry to a magnesium foundry. Approval was granted in September, 1942 and work immediately was begun to make the necessary changes and installation of equipment. In November a pilot plant was in operation, and formed the training base where the foundry personnel received instruction on various phases of magnesium castings production. Four months later—to be exact on Feb. 15, 1943—the foundry began operations on a production basis, and since that time has made gradual and gratifying progress in output, and ability to handle intricate castings.

Original intention and plans (*Please turn to page* 236)

Fig. 1—Drag for rear crankcase casting. Fig. 2—Complete set of 26 cores for the crankcase. Fig. 3—After the cores are set they are gaged to insure proper location. Horn gates are located under cores at corners Fig. 4—Gates and risers are sawed off where possible with a bandsaw. Fig. 5—Cope for rear crankcase showing entrance gate and numerous riser openings. Fig. 6—Tapping molten metal from the holding furnace



Casting Breech Rings

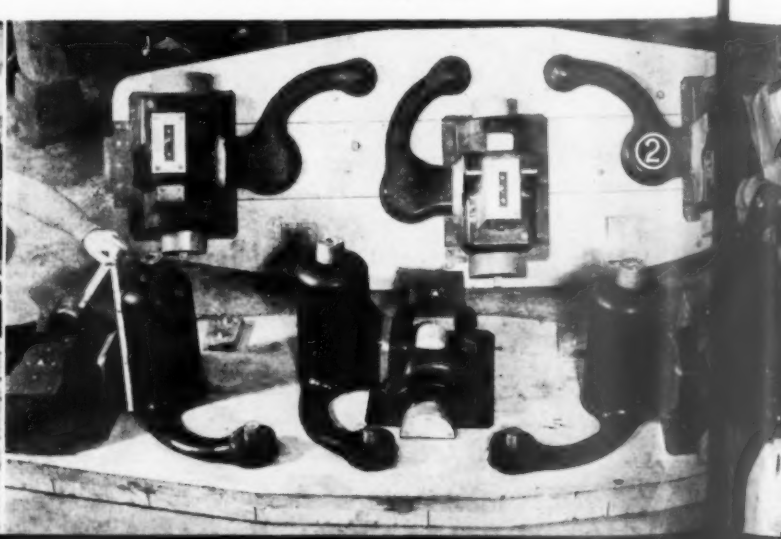
CASTINGS have provided the means for breaking a number of bottlenecks in the war production program. In some instances where entirely new applications for castings have been developed, the substitutions not only have solved supply problems with an equally satisfactory or superior product, but they also have resulted in important economies in the war effort.

One of the best examples of how adoption of castings licked a production problem with time-saving efficiency is that of the breech ring for guns. The breech ring, which is screwed onto the gun barrel, provides for the attachment of the breech mechanism, and must be strong enough to withstand the shock of the exploding charge. World-wide practice in the past had been to machine the part from a steel forging, but when this country embarked on its huge rearmament program it became obvious that steel forging capacity was insufficient to provide forged breech rings in the desired volume and at the same time satisfy the need for forgings for other war purposes.

In June, 1941, the Ohio Steel Foundry Co. shipped four cast steel 90 mm. breech rings from its Lima, O., plant to the Ordnance Department for testing. Said to be the first 90 mm. steel breech rings ever made by casting, they were delivered 6 weeks after the company started the necessary design engineering work and development of its foundry and heat treating practices for the job. After exhaustive tests of the breech rings, climaxed by firing tests under greatly expanded overloads, they were pronounced satisfactory by Ordnance officials. Since that time the Ohio Steel Foundry Co. has completed the engineering and patternmaking for cast steel breech rings for 17 other sizes and types of guns. Today, the company is furnishing castings for a large proportion of the breech rings used in guns between 57 mm. and 240 mm. in size. These include the special 75 mm. gun mounted on certain army bombers.

Physical specifications established previously for forged breech rings were followed in developing the cast rings. These specifications require a minimum yield strength ranging from 65,000 to 135,000 pounds per square inch, depending upon the gun design, with ductility ranging from 35 per cent on the higher strength to 65 per cent

Fig. 1—Large flasks rammed by sandslinger at left are moved over roller conveyor to station for mold wash application before being carried through skin drying oven. Fig. 2—Patterns for medium-size breech ring. Note large feeding heads



By WILLIAM G. GUDE
Associate Editor
THE FOUNDRY

for Guns

on the lower yield steel. To date no breech ring failure caused by a casting defect has been reported.

The castings are composed of a medium manganese, molybdenum steel. Selection of this composition was an important conservation move because of the critical supply position of nickel and chromium at the time the cast rings were developed. Monthly savings in the early days of production were placed by an Army Ordnance publication at 30 tons of nickel and 20 tons of chromium, and the conservation became still more significant as output subsequently was tripled.

Some of the natural advantages of cast products likewise proved of considerable value to the war production program when cast breech rings were adopted. Foremost of these is the ability to cast breech rings relatively close to the size of the finished parts. This means a minimum of machining on the part of the gun manufacturer —a consideration which was doubly important at a time when machine tools were impossible to obtain without long delay. In one case a gun plant in the process of tooling found that the reduced amount of machining required on the rings made it possible to cut its estimated need of 21 broaching machines to only 4, a saving of over a million dollars on this one item alone. Actual time saving in machining cast rings to finished size is estimated at 25 to 40 per cent compared with machining forged parts.

Flexibility of casting procedure also has proved valuable. This has been utilized in certain instances in effecting changes quickly in breech ring design, and in filling the need for new types or sizes of guns required by the fluidity of war. In one case design changes were ordered by telephone from Washington, and it was possible to deliver the new castings before the blueprints showing final design had been received by the company.

The demonstration that castings could be used successfully for breech rings, immediately presented the problem of how to supply these parts quickly in the large volume demanded by the armed forces. That this task was accomplished was due in no small measure to the ingenuity of the Ohio Steel Foundry Co. in overcoming a shortage of production facilities until the time when additional capacity could be provided. It was apparent

Fig. 3—Finishing breech ring cores and applying wash. Larger cores are hand rammed, with smaller ones made on a blowing machine. Cores are baked in a tower oven.
Fig. 4—Setting cores in the drag after mold has emerged from the drying oven

that a specialized foundry adequately equipped for mass production of the breech rings was desirable in order to provide the required output, particularly in view of the demand of other work on the capacity of the company's open hearth foundry. Consequently, construction of a new foundry was started in January, 1942, and in the spring of 1943 it swung into production.

Pending completion of the new plant, casting of the breech rings was continued in Ohio Steel's existing foundry and also by the Buckeye Steel Castings Co., Columbus, O. The latter company was enlisted to supply part of the output in the form of rough castings not heat treated, until the new foundry could be completed. Meanwhile, a certain amount of improvising was resorted to at Lima in providing some equipment. Heat treating capacity, for instance, was insufficient to handle the additional load of breech ring work, and new furnaces could not be obtained immediately. However, some large, continuous, used furnaces were located in another district, torn down and shipped to Lima. These, together with liquid quenching facilities, were housed in a hurriedly constructed wood building, and the threatened delay was overcome.

Shot blasting equipment—needed to remove scale from the castings after the final heat treatment—presented another problem because it was not readily available. To save time, the company's maintenance men built a chamber which served the purpose until a new and larger unit could be obtained. Meanwhile a new heat treating plant was being built to accommodate the larger volume of work scheduled for subsequent months, and the new facilities became available at about the time the new foundry was completed last spring.

The new breech ring foundry was designed to take advantage of the high-speed production offered by modern, mechanized equipment. As a result, a minimum of manual effort is required in the various operating steps between the molding of the rings and the delivering of the castings to the machine shop.

The breech rings are cast in large flasks accommodating up to eight patterns of the smaller rings which are mounted on match boards. In molding, the match board is placed inside of a steel frame, which is affixed to the table of a rollover machine. The flask rests on the frame, and is rammed by a sandslinger. Sizable risers, or feeding heads, are provided as part of the breech ring patterns. As shown in Fig. 2 the heads for the 75 mm. ring are located on the side of each pattern, and are approximately 8 inches in diameter and 15½ inches high. On some of the larger sizes, the heads are located directly above the pattern of the breech ring proper and are rectangular rather than circular in cross-section. For instance, the head for one type of breech ring is 24 inches high and 20½ x 23½ inches in cross-section. Patterns are made of mahogany, with all wearing points—including core prints, lugs and sides (*Please turn to page* 268)

Fig. 5—Closing the mold preparatory to pouring. Fig. 6—Molds are poured at 2750 to 2800 degrees Fahr. depending on the number to be poured. Fig. 7—Using cutting torch to remove the large feeding heads from the castings. Fig. 8—Stamping serial and heat numbers on breech rings during the final inspection

BORON as an accelerator of malleable annealing

By DR. HARRY A. SCHWARTZ
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Cleveland

SOME 20 years ago the research department of the National Malleable & Steel Castings Co., Cleveland, investigated the effect of adding boron in amounts approximating 1 per cent to white cast iron. The metal became entirely un-annealable, and certain interesting changes in microstructure were observed. Metals containing the conventional amounts of carbon found in malleable iron, looked, after the addition of such amounts of boron, as though they were hypereutectic.

In 1926, acting on suggestions by Dr. Richard Walter, a German who had taken out patents on the use of less than 0.1 per cent boron in ferrous alloys, the department investigated the effect on graphitization of such additions and found that graphitizing rate at high temperature (equivalent to the first stage of annealing) was increased by the addition of either 0.1 per cent or 0.04 per cent boron, and more in the latter case than in the former.

Motivated by a desire for uniform annealing and a reduction in annealing time if possible, Paul Martin at the Cicero Works of the National Malleable & Steel Castings Co., experimented with various boron additions and came to the conclusion that an addition of about 0.001 per cent boron considerably accelerated anneal. This addition has been the general practice of the National company for a considerable time. Inquiries were invited through the Malleable Founders' Society and the facts were communicated to such of the company's competitors as cared to ask for information.

There seems to be a sufficient general interest in the subject to justify a brief outline of what has been accomplished. The addition of boron in the amount indicated; namely, 0.001 per cent is probably the best general practice which can be adopted. It is possible that if other alloys which are of a character to retard annealing excessively are carried into the metal through scrap, a somewhat larger addition might be desired. However, an excess of boron is to be avoided as it may cause annealing difficulties and deterioration of quality.

Additions are best made just as late before pouring as possible, in the form of ferroboron, although many other alloys perhaps may be used successfully if they do not contain substances harmful to the annealing reaction. In duplexing, additions to the furnace or to the stream of cupola metal are feasible, though ladle additions may be preferable. By analogy with larger additions to steel, a recovery of boron between 70 and 100 per cent is estimated. The amounts involved are so small as to make their absolute determination somewhat uncertain.

A very easy way to note whether a harmful amount of element is present is to observe microscopically the size of the temper carbon nodules. Undesirable amounts of boron manifest themselves by causing the temper carbon near the surface of the casting to be in an abnormally fine subdivision. Using the recommended amount of boron for many months has not produced this condition, which is quite a sensitive test.

It is probably true that boron could be reduced from borax added to the slag. However, direct experiments have shown that slags rich in boron can abstract iron oxide from the metal, probably by forming a borate of sodium and iron with undesirable results.

The practice of adding boron is regarded by the present writer not so much as a means of shortening the annealing cycle proper to an alloy of normal composition, as for the purpose of acting as insurance against annealing difficulties arising from unforeseen causes. For example, the recommended amount of boron has permitted the annealing of metal containing as much as 0.1 per cent chromium and sometimes more, without any special difficulty. This is not to be construed as a recommendation of the addition of retarding elements and boron, although such a combination theoretically is quite possible.

Any reductions in annealing cycles depend, of course, on how much of a safety factor the original cycle contained. As the National company's plants are operated, mis-anneals substantially are due invariably to the retention of pearlite in second stage annealing. Under these circumstances it has been possible, sometimes merely through the use of 0.001 per cent boron, to reduce annealing times by approximately 10 per cent. Therefore, it seems that boron has an effect in accelerating second stage annealing.

Statistical studies on long runs of products, made with and without the use of boron, have convinced us that the addition has no significant effect on the tensile properties, provided that excessive amounts of boron are not added. The use of this alloy in the manner and under the circumstances described, has proved useful under the present conditions of poor scrap supply in maintaining the commercial annealability (*Please turn to page* 182)

Factors in the Production of quality castings

By WILLIAM G. REICHERT
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The author discusses various phases of foundry melting and pouring practice which influence quality of product. This is the concluding article of three on the subject of factors affecting casting quality. Previous installments appeared in the February and March issues.

THE responsibilities of melting and molding often overlap, and unless there is a mutual appreciation of this fact it may be the prime cause of failure to produce the best quality most economically. Unless those responsible for the qualiy of the product and the economy of the melting process have complete supervisory authority either the quality of the product will fail to meet specifications or the costs of production will increase.

Careful and consistent melting operations must be practiced, otherwise the value of composition and specifications are negligible. The entire foundry industry has now become aware that the only method to produce high quality castings is to insist on precise control of all melting operations. Today cast iron can be made of approximately 100,000 pounds per square inch tensile strength when heat treated and 70,000 pounds as cast. However, merely writing specifications of analysis will not produce this type of iron, nor can it be produced on a very highly competitive price basis alone.

The first consideration in the melting of quality metals is the design and preparation of the furnace, whether it be an electric, open hearth, cupola or air furnace. In considering the design of a cupola attention should be centered on the depth of the crucible, tuyeres, height between tuyeres and charging door, location of tap and slag hole, capacity of the furnace and the capacity of the blower.

Careful thought should be given to the quality of refractory for the various parts of the furnace and the method of lining. After use the slag should be chipped off and the patching material rammed properly. To maintain a quality product requires use of suitable raw materials, such as the fuel, flux and iron and steel mixtures.

Because of the vast number of cupola furnaces installed let us follow this method of melting to determine how these operations affect the quality of the metal. A number of cupola operating factors which regulate the quality of the metal from the weighing of the charges to the shakeout of the castings include:

1. The method of charging the furnace. Weight, type and sequence of charges are important.

2. The metal mixture should be of uniform size. Small sections and small pieces produce oxidized metal, while large thick sections produce cold metal. Therefore the size of the metal section, the size of the metal charge, coke and limestone should be maintained within limits.

3. The bed coke should be measured by volume and the coke added between charges by weight. The important features here are the height, placement and ignition of the bed and soaking time. Height of the bed naturally depends on the pressure and the velocity of gases which pass through the cupola.

4. A constant melting zone is essential. This is influenced by the pressure and volume of the blast used.

5. Proper fluxing using a slightly basic slag together with hot melting will reduce the sulphur. For some types of castings and operations a desulphurization of the iron is required.

6. The quantity and pressure of the air delivered to the cupola are important factors in the production of quality iron. An air meter or weighing device to control the air delivered to the cupola is necessary. Melting 100 tons of iron with a coke ratio of 9 to 1 requires blowing approximately 2,500,000 cubic feet of air through the cupola. At 0.0765 pounds per cubic foot, this air weighs nearly 200,000 pounds. Air which enters the cupola should be weighed. A difference in temperature from 0 to 100 degrees Fahr. will show a difference in volume of 18 per cent, and from 29.5 to 31.5 barometric pressure will show a difference of 3.3 per cent in volume of the blast.

7. A wedge test is an important control of cupola irons under immediate operating conditions.

8. Burning rate of the coke which controls the melting rate of the iron with the proper addition of air are definitely important factors to be considered.

9. Different types of work may require the cupola to be slagged differently. For some cupola operations it is advisable to install a front slagger, a forehearth or mixing ladle.

10. The type of scrap is an important consideration.

Improper attention to these factors definitely will produce oxidizing conditions, variations in temperature, defective castings and will ruin the physical properties of the metal.

The form which carbon (nodule or graphite) occurs in the iron is regulated not (*Please turn to page* 218)

Selecting Evaluating and Specifying METALLIC MATERIALS

Abstracted from a report

By H. W. GILLETT

Finding how to insure quality and freedom from scatter in metals is a lot more important than how to make chemical and mechanical post-mortems after service failure has occurred. Causes of variations in quality are discussed in this third article from a War Metallurgy Committee Report

MATERIALS that we ordinarily appraise as tough, sometimes fracture in brittle fashion under a single blow. Our first impulse is to blame the material and try to set up a test to evaluate its propensity toward brittle behavior. On the assumption that the test tells all, we are then prone to draw unwarranted conclusions from the test figures.

The test consists in measuring the foot-pounds of energy absorbed in fracturing a bar carrying a notch of such severity that any engineer would do his best to avoid it if he can possibly find a way to do so. Results are reproducible *only* for a given size bar and given notch. While they are sometimes reported in ft. lb./sq. in. or kgm/sq. cm. of area back of the notch, this is a fiction, for there are no reliable conversion factors. Scale models do not tell consistent stories. This should at once make us suspicious of data given by a tiny specimen. Use of larger specimens, especially a comparison of the results shown by single, double, and triple width specimens, tends to imitate the behavior of a large notched part a trace more closely, but there is still no assurance that service behavior is truly reflected.

The whole thing boils down to the fact that notch brittleness depends as much on the geometry of the piece, the restraint this geometry of size and shape imposes upon plastic deformation, as upon the ability of the material to deform in plastic fashion.

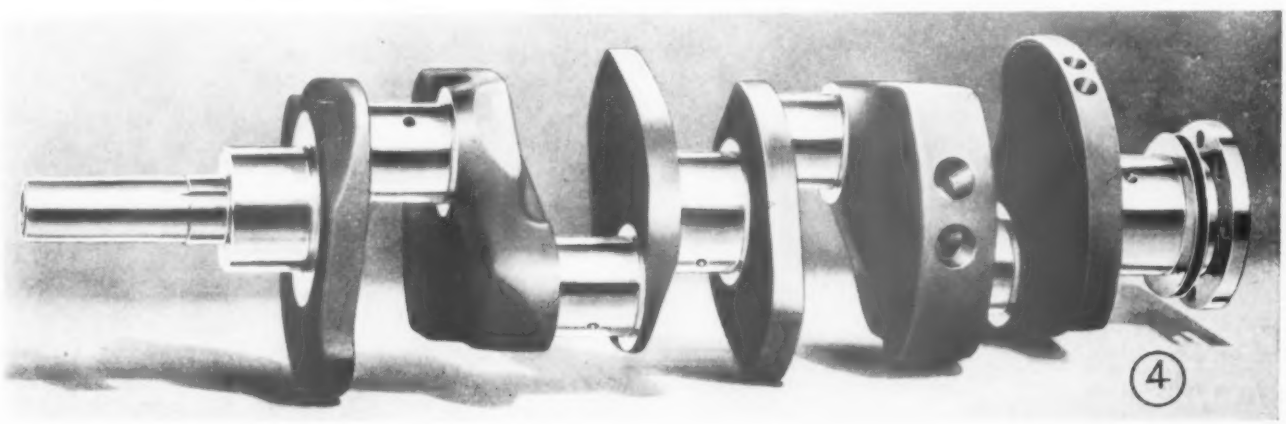
According to theory, brittle behavior depends on the ratio of shear *strength* to "cohesive *strength*", and on the ratio of applied shear and tensile *stresses*. Unfortunately, no one knows how to measure "cohesive strength"; even its order of magnitude has to be judged by very indirect methods.

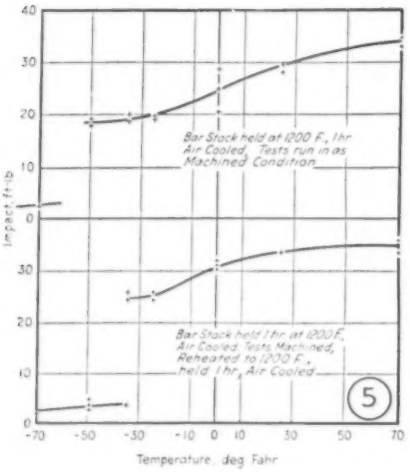
When a material is without ductility in the tension test, and gives a flat break, without necking, the notched-bar test likewise shows it brittle. This is the case with cast iron. The reverse is not necessarily true. When a material does have ductility in the tension test, and thus can deform when conditions of constraint allow it to deform, and it starts to deform, it cold-works. The cold-work may alter the ratio of shear to cohesive strength and the ratio may also be altered by temperature.

A given notch in a given sized bar thus selects one particular ratio of tensile to shear *stress*, and the material behaves according to the ratio of shear and cohesive *strengths* developed by the permitted deformation and the temperature. The test is accurate for that particular set of conditions, but does not allow extrapolation to any other set of conditions. For this reason, the foot-pound figure of a notched-bar impact test has value *only* in checking on whether two supposedly like materials are alike.

Service brittleness may be met, even in materials ordinarily considered highly ductile if applied stresses throw "triaxial" tensions on the part.

Fig. 4—Ford cast crankshaft. Specimens cut from heavy sections show zero elongation in tensile test, and 1 foot-pound charpy notched bar impact resistance




Bar Stock held at 1200 F., 1 hr Air Cooled, Tests run in as Machined Condition
Bar Stock held 1 hr. at 1200 F. Air Cooled, Tests Machined, Reheated to 1200 F., held 1 hr., Air Cooled
Impact, ft-lb
Temperature, deg. Fahr
5

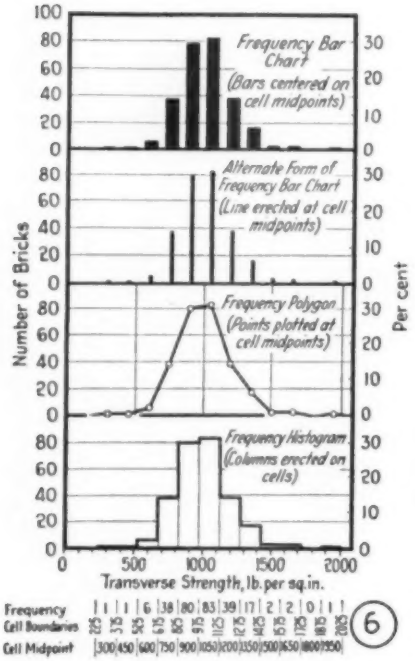

Frequency Bar Chart (Bars centered on cell midpoints)
Alternate Form of Frequency Bar Chart (Line erected at cell midpoints)
Frequency Polygon (Points plotted at cell midpoints)
Frequency Histogram (Columns erected on cells)
Number of Bricks
Per cent
Transverse Strength, lb. per sq. in.
Frequency
Cell Boundaries
Cell Midpoint
6

Table II

Comparative Physical Properties of Cast Metals

	Tensile Strength, p.s.i.	Elongation, Per Cent on 2"	Ft. Lb. Impact To Break ¼" Square Bar at Room Temp.
Sand Cast Malleable Iron	56,000-56,000	12-22	8-12
Sand Cast Brass	25,000-35,000	10-28	720
Cast Iron	25,000-35,000	.....	0-2
Die Cast Aluminum Alloys	25,000-35,000	1-5	2-5
Die Cast Zinc Alloys	35,000-55,000	4-10	15-20

A material of 20 ft. lb. in the "standard" test is not "twice as strong", as one of 10 ft. lb., and, for two different materials, like figures of 10 ft. lb. each do not necessarily connote likeness in any other set of conditions. Their response to temperature, to different sizes of specimens, and to different notches, may be quite different.

Nor may brittleness or toughness in the notched-bar impact test be taken as an indicator of notched-fatigue behavior. Cast iron, very brittle in the single blow notched-bar test, is very insensitive to notches in fatigue.

If we are not going to subject the material to stress conditions conducive to brittle behavior, low notched-bar impact figures are not a detriment. The Ford crankshaft, Fig. 4, with around 1 ft. lb., yet serving in millions of cars, is an excellent example.

Benson[13] comments, "For ordinary engineering purposes, a high impact figure obtained on a small test piece has no real significance and is not essential for satisfactory service. ° ° ° In ordinary work actual engineering requirements would be met by an izod test in the region of 5 to 10 ft. lb."

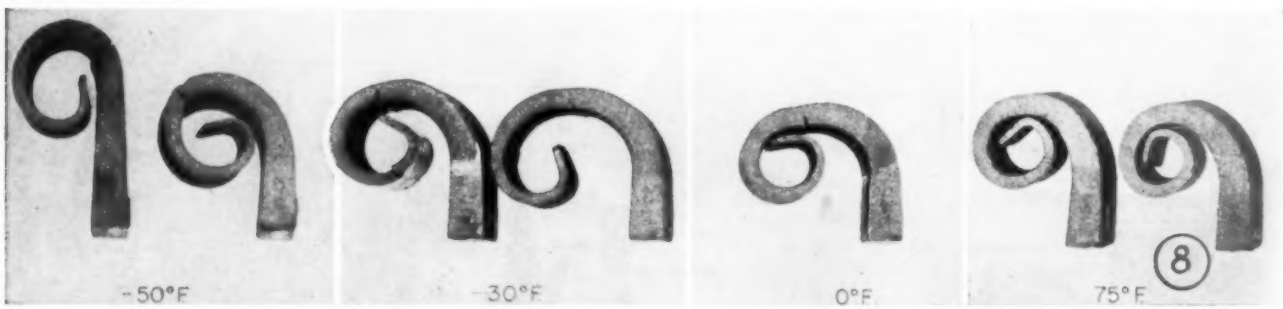
It would be unfair to class cast iron as a glass-brittle material, for it has a kind of toughness, and various cast irons have various degrees of toughness, indicated by deflection in the transverse test, and by impact tests on unnotched bars. When shock is not involved in service, cast iron is not handicapped, but when it is involved, as in the case of a "near miss" of a bomb falling near a ship with cast iron valves and fittings in its piping, the cast iron parts may shatter and a tougher material has (*Please turn to page* 272)

Fig. 5—Charpy data at low temperatures on an 0.35 per cent carbon steel. Note particularly at lower left of figure that 3 tests at —35 degrees gave 26, 24 and 4 foot-pounds, illustrating borderline condition. If only two tests had been made showing higher values, the steel would have been considered as thoroughly tough by the ordinary observer; whereas increase in specimen size or slight decrease in temperature would make it brittle

Fig. 6—Methods of plotting frequency of occurrence. The plot tends to be symmetrical, balanced around the average. From A.S.T.M. Manual on Presentation of Data, 1933 (second printing 1937)

Fig. 7—A probability plot that shows two humps indicates that two major causes for scatter are operating. From A.S.T.M. Manual for Presentation of Data

Fig. 8—Toughness of malleable cast iron



Single blow notched Charpy value, ft. lb.	3.5-4	5	5.5-6	8-8.2
No. of 70 ft. lb. blows on wedge	14-22	22-24	27	30-30

In concluding this series of three articles on use of inoculants to control structure of gray cast iron, the authors describe effects of temperature, time, and melting practice on properties of inoculated metal.

Structure Control of Gray Cast Iron

By R. G. McELWEE and TOM E. BARLOW
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AS PREVIOUSLY mentioned, temperature of the iron being inoculated must be sufficiently high to permit complete solution of the added materials. Aside from this, however, there are certain other factors which make high temperature advantageous. In the first place, it has been established definitely that, in completely inoculated irons, an increase in temperature results in an increase in mechanical properties. On the other hand, excessively high temperature in an uninoculated iron may be deleterious. Secondly, the higher the melting temperature above the optimum, the greater will be the amount of inoculation required. This is particularly true and extremely important in electric furnace cast irons.

Effect of pouring temperature is also a consideration when a completely controlled structure is desirable. Research work would indicate that a pouring temperature on the order of 2700 degrees Fahr. is most advantageous from the standpoint of mechanical properties, in a completely inoculated iron. Obviously, of course, this temperature frequently is too high for many types of castings because of sand conditions, shrinkage, and other factors. However, pouring temperatures should be kept as high as is compatible with foundry conditions to minimize the tendency toward the formation of type *D* graphite. In some heavy castings which are poured rather cold, the tendency toward the formation of type *D* graphite is increased to the extent that, what would ordinarily be considered an excessive amount of inoculation, is then required. If it is necessary to pour castings on the cold side, for example below 2550 degrees Fahr., an additional amount of inoculant should be allowed to ensure satisfactory results.

Hold Iron Too Long

It is a well established, but easily neglected fact, that time of holding the molten iron in the ladle is an important consideration in the proper use of ladle inoculants. Briefly, the situation is this; after a ladle of iron has been held a given length of time, subsequent to inoculation, the effect of the inoculation begins to disappear. After this time, the effect of inoculation may be entirely spent, and the resulting casting would have all of the mechanical and physical properties of an uninoculated iron. The exact time during which the iron will remain inoculated depends upon the amount and type of inoculating material used. An insufficient amount of inoculant for complete treatment will start to lose its effectiveness very rapidly, but even when the optimum amount of inoculant is used, the length of time during which it will remain effective depends upon its composition. Some inoculants are effective for as little as 4½ minutes; other inoculants may be effective for 30 minutes or longer. In general, it is believed that the more complex materials remain effective for the greater period of time. Apparently the time during which an inoculant remains effective is related to the initial rate of the reaction, the slower acting materials being effective over a longer period of time.

This factor is of vital interest for a number of reasons. In the first place, the usual foundry practice consists of pouring the chill block and test bar soon after the ladle has been filled with iron. These tests may indicate complete inoculation, and the foundryman may not realize that a casting poured out of the same ladle 30 minutes later will not have the physical properties indicated by the test bar. Therefore, it is first essential that a ladle inoculant is chosen which will remain effective throughout the time that it is necessary to hold the ladle. In the second place, if the ladle of iron must be held, it is essential that the inoculant be added as late as possible. For this reason, when fore-hearths are used, it frequently is desirable to add the inoculant as the metal leaves the receiver instead of as it flows down the cupola spout. If a large ladle of iron must be held for a prolonged period of time before pouring, the metal may be reladled and the inoculant may be added during the process of reladling.

In the event that an inoculant is added to a ladle of iron with the expectation of pouring it within the effective lifetime of the inoculant, and, due to breakdown or some other unexpected contingency, the ladle is held longer than anticipated, the metal may be re-inoculated without deleterious effects. If, however, the first inoculation was made with the stabilizing type alloy, the second inoculation should be made using the graphitizing type. This is done to avoid excessive pick-up of chromium.

As indicated previously, composition of iron is one of the important factors in determining the type of inoculant to be used. Composition may in part determine the amount of inoculant required. (*Please turn to page* 256)

QUESTIONS and ANSWERS

Wants Information on Bessemer Pig Iron Composition Range

Q.—Can you give us information on what the usual range is in composition for bessemer pig iron?

A.—According to "Steel Products Manual", section 1, published by the American Iron and Steel Institute, bessemer pig irons have the following range of composition: Silicon 1.0 to 3.0 per cent; sulphur 0.05 per cent maximum; phosphorus 0.076 to 0.100 per cent, and manganese 1.25 per cent maximum. As you undoubtedly know, bessemer pig is used in the foundry principally because its low phosphorus content permits considerable reduction of phosphorus in the final iron.

Has Trouble With Leakage in Bronze Valve Castings

Q.—We are having trouble with leakage in brass valves made of the 88-10-2 composition when tested at 60 pounds per square inch water pressure. We are using cores to form the bottom of the valve, but it does not produce sound castings. We melt in coke-fired pit furnaces.

A.—Since the 88-10-2 alloy has a tendency to form crystals with microscopic passageways between, it is not unexpected that you have trouble with leakage. The cure is close attention to gating and risering so that the castings are fed adequately. Casting of valves with a core to form the bottom part is more or less standard practice. Some manufacturers have found it advantageous to incorporate chills in the cores at strategic points to insure uniform cooling.

Possibly the leakage may be due to the formation of the delta constituent in the 88-10-2 alloy, and you might try annealing or heat treating the castings at 1000 degrees Fahr. for 3 to 5 hours to absorb the delta. Then the castings are cooled slowly in the furnace to prevent reformation of the delta constituent.

We believe that you will be much better off to change to another alloy, particularly in view of the tin shortage. You might try the 88 per cent copper, 6 per cent tin, 1½ per cent lead, 4½ per cent zinc alloy, or the well known 85-5-5-5 alloy. Even less tin is used in the widely used "valve composition" containing 81 per cent copper, 3 per cent tin, 7 per cent lead, and 9 per cent zinc which is suitable for low pressures. Those alloys contain lead and will be much easier to machine than the 88-10-2 alloy.

Presumably your melting practice is good since coke fired pit furnaces are more likely to be foolproof than the others. However, see that the fires have adequate draft so that melting is rapid, and see that none of the ingot or scrap is allowed to extend above the top of the crucible. See that your molds are vented well, and that gates and risers are of the proper size and located to perform as they should.

Wants Information on Making Cast Aluminum Patterns

Q.—We are interested in learning how to make aluminum castings for patterns by both sand mold, and pressure molding procedures. Are any books available on pressure molding, and where can we purchase a small amount of the right kind of sand? In general we want to start from scratch, and learn all we can.

A.—While you do not mention it specifically, you presumably are familiar with the making of wood patterns, and want to extend your field to the production of aluminum patterns. Hence, you know that the master pattern must have a double shrinkage allowance to take care of shrinkage or contraction for the metal pattern, and also for the casting made from the metal pattern. Since the pattern must be as smooth as possible, the sand used must be as fine as possible. For example a naturally bonded sand falling within A.F.A. classification IG with a grain fineness from 200 to 300, and a clay content from 20 to 30 per cent will give smooth surface, but due to its fineness must be handled carefully since it is low in permeability. Possibly somewhat coarser sand in the 2E or 2F classification with a grain fineness from 140 to 200, and clay contents respectively of 10 to 15, and 15 to 20 per cent may give sufficient smoothness, but less trouble from gas and blow holes. Suitable sand can be purchased from any foundry supply house in small quantities.

Pressure molding method for pattern production involves use of plaster of paris or gypsum as the molding medium, a long sleeve or sprue, and air pressure. In brief the procedure consists in coating the pattern with an oil-wax parting compound, and placing it in a suitable frame. Then the liquid plaster is poured over the pattern. After the plaster sets, the mold is removed from the pattern and placed in an oven to dry thoroughly at a temperature of 600 degrees or above. The higher the temperature, the shorter the time for drying. When ready for pouring, the long sleeve, usually made of plaster, is attached to the sprue opening of the casting with a disk of asbestos paper placed at the bottom of the sleeve to close the opening. The disk is of such size and thickness that it will prevent the molten metal entering the mold until air pressure is applied at the top of the sleeve. Then the tube or sleeve is filled with molten aluminum alloy, the air pressure applied, and the cavity filled. The long sleeve is large enough to contain sufficient metal to fill the mold com-

pletely, and is a variation of the reservoir and plug method used in making certain types of brass and bronze castings.

Aluminum must be melted and handled properly to obtain castings that are sound and free from defects. Consequently, you will have to do considerable experimenting and study to insure reproducible results. That also will apply to molding in sand and in plaster. Therefore, we believe that your best procedure would be to visit several pattern shops doing that type of work, and get information. Better yet, join one of them and obtain the data first-hand by actually doing it.

Fine Facing Sand Required to Produce Sharp Impressions

Q.—We manufacture small brass and bronze castings in the form of builders hardware and use a molding sand comprised of Albany No. 0, plus molasses and salt which gives fair results on ornamental design without using a facing, and with very little venting. We would like to eliminate the salt and molasses and also to use the sand without any special facing.

A.—Evidently the sand mixture you now are using is one where the molds are dried, at least on the face, before use. However, we should judge that the use of molasses makes the sand sticky, with a tendency to adhere to the pattern. We believe that to obtain fine detail on the ornamental work you should use a finer grade of Albany sand, for example No. 00. While we all would like to be able to avoid the use of facing, we do not believe that is possible when castings with sharp impressions are desired. Consequently, the patterns should be covered with a thin layer of sand which has been sifted through a relatively fine screen or sieve. The remainder of the sand to fill the flask is taken from the heap.

Further preparation of the mold face is to coat it with a little soot by holding it over a smokey flame. A yellow flame from an acetylene torch is excellent for the purpose. If that is not convenient, try applying a thin coat of flour from a bag. The excess flour should be blown off the face of the mold.

Boiling in Ladle Is Result of Extremely High Temperature

Q.—We would like to get some information on oxidized iron. We notice that when the iron comes white hot from the cupola, there is a light smoke emitted, and when it runs into the ladle, the iron boils at the lining. The lining however, is perfectly dry and not the cause of boiling. If we throw in chillers and the iron cools down, the boiling stops. Are those signs of oxidation? If so what are other indications to detect the condition in the castings? The boiling in the ladle causes a black slag to form on the lining.

A.—Since you do not mention the appearance of an increase in defective castings, particularly those containing pinholes, slaggy particles on the drag side, and trouble with keeping the iron hot for any length of time, we believe that you can dismiss oxidized iron from your mind. Our opinion is that you are melting your iron extremely hot, much more so than usually is the case. Hence, while under ordinary conditions the lining of the ladles is dry enough, the superheated metal heats up the lining more rapidly, and drives off the remaining moisture. One can only be sure that a ladle lining is absolutely dry when it has been maintained above a red heat (preferably nearly white) for an extended period of time. Wood fires usually do not result in the bottom being as dry as the sides.

Has Difficulty With Gas Holes Appearing Under the Core

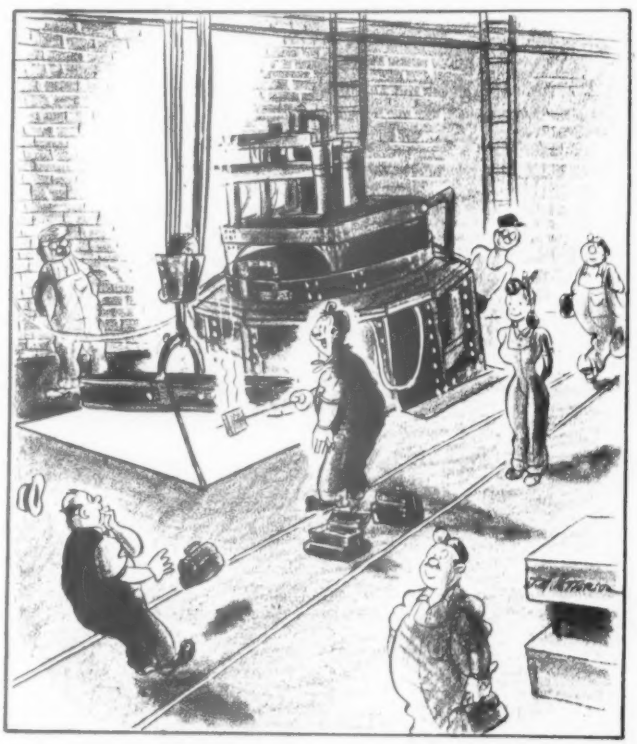
Q.—We are having some difficulty with gas holes on 80-10-10 metal. The bushing is 8 inches long and the holes appear on the bottom side of the core. The casting is poured on one end, and tipped. We also are having the same trouble with larger bushings. The trouble just appeared recently.

A.—Your description indicates that you are casting the bushings on the side with the metal entering at one end, flowing up around the core, and that the holes are located under the core. Several explanations of the condition are possible. One is the size of the gate. If insufficient metal flows into the mold at a given time, it tends to chill rapidly, and trap bubbles of gas generated through contact of hot metal with moist sand. The condition also may be due to pouring the metal at too low a temperature.

Possibly you may be using a core coating which might not be dried thoroughly. Again the molder may be using the swab a little too heavily to obtain a good joint after the pattern is removed. Frequently, the presence of such bubbles indicates that the metal has been gassed during melting. Usually entrapped bubbles in gassed metal are not located in one spot, but distributed under the skin and in the last metal to freeze. We believe that if you check over carefully all the phases in producing the casting, you undoubtedly will find the cause of the trouble, and then can eliminate it.

GANGWAY!

By J. A. Patterson



"You don't mind, do you? I'm having lunch with Miss Lovelace and she likes her sandwiches toasted."

High Tin Bushings Are Not Smooth

Q.—We are making bushings 7 inches outside diameter, 6 inches inside diameter, 13 inches in length, molded and cast horizontally. Composition is copper 82 to 84 per cent, tin 12.5 to 14.5 per cent, remainder zinc. We do not do the machining. Our customer complains that the surface is so rough after machining that it cannot be polished to the desired degree. We shall appreciate your opinion on whether the crystalline structure of the metal is too coarse, or if the fault lies with the tool and method of machining.

A.—The high-tin copper alloy has the peculiarity of developing a very coarse granulation or crystalline structure which is difficult to machine without tearing or breaking the individual crystals which later pop up leaving a rough surface. The only correction for this is the method of machining, which means that a very sharp tool—preferably a very sharp diamond pointed tool—must be used and a very small amount of metal removed in the final cut. Even this will leave a surface that upon examination under the microscope will show some little specks that one may think are defects.

Of course polishing after machining is necessary if the highest polish is to be attained. To secure this high polish, an extremely fine abrasive must be used as the polishing compound. The trouble apparently is in the machine shop and not in the foundry. Claim is advanced occasionally that this form of trouble may be cured to some extent by heat treatment or annealing. This treatment is disastrous to the bearing value of the crystal structure. After annealing, it no longer has anywhere near as much value as a bearing metal as before and in most instances these high tin compositions are specified principally because of their bearing value.

Silicon-Carbon Data Is Presented

Q.—We have read frequently in articles on analyses of metals to "adjust silicon content to section." We do so according to our own calculations, but have been wondering if there is any standards set on different carbon irons—say 3.00, 3.30, and 3.60 per cent total carbon with 0.100 per cent sulphur, 0.15 per cent phosphorus, and 0.60 per cent manganese. Also we have noted that the "pouring temperature may be too high for a method of gating or for a certain metal composition". When might such cases exist?

A.—From time to time a number of formulas have been proposed to show the relationship between total carbon and silicon, but in general they apply to the same materials melted under the same conditions, poured at the same temperature into bars or sections of the same size. Some years ago F. J. Cook, an eminent British foundryman, stated that he found a silicon-carbon relationship which gave good results. His formula in a reduced form is $X\ (15.336-Si) = 3.6\ C$, where X is a constant—0.9 to 1 for pipes, easy machining castings, and general ordinary castings; 0.83 for locomotive cylinders and castings requiring maximum transverse strength; 0.76 to 0.82 for steam and other cylinders and castings requiring maximum tensile strength; 0.75 to 0.8 for chilled castings, and 0.85 for acid resisting castings.

Another formula which has probably been used to a greater extent than any other is $C+0.3\ Si=4.3$ and as a variation of that Fred Sefing proposed $C+0.6\ Si=4.25$, stating that with 4 to 5-inch sections the formula should be $C+0.6 = 4.0$, and with 6 to 10-inch sections it should be $C+0.6\ Si=3.8$. It may be that none of these will serve your purpose, but you could develop one or more to fit your conditions if you have enough data available.

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THE FOUNDRY—

BOOTH 403 AT BUFFALO

As far as pouring temperature and gating are concerned, the main essential to be observed is the length of time which the metal flows through the system. The longer the time, the greater the chance that the sand bond may disintegrate, and some of the sand will be carried into the mold cavity. Hence, the gating system should be designed so that the mold cavity can be filled as rapidly as possible without the necessity of having to depend on extremely high temperature metal.

Reference to pouring temperature and composition presumably goes back to the work of White and DiGiulio on the effect of superheating of cast iron. They found that certain compositions of gray iron, more particularly the low carbon types, could not be heated above certain temperatures without decrease in physical properties. Also that for the various irons investigated an optimum pouring temperature existed which provided the best physical properties. For details of compositions, etc., we suggest that you consult "Factors Affecting Gray Cast Iron" by the previously mentioned authors in *Transactions* of the American Foundrymen's Association, Vol. 43, 1935.

Discovery Comes Rather Late

Q.—Recently we came across an item which reads in part, "Malleable cast iron is here at last. Problem has baffled metallurgists for centuries. Now a Chicago company has developed successful process which consists in mixing carbon, silicon and lead with pure iron. New product will replace more expensive steel for many purposes and simplify many machining problems. It will find uses where it must withstand vibration and shock, uses for which ordinary cast iron is too brittle." We had intended installation of a malleable division but if there is a new system of making malleable cast iron, we would like to know the details.

A.—Apparently producers of malleable cast iron have been hiding their lights under the well known bushel all these years, and undoubtedly will be greatly elated that they have at last been "discovered," or at least gained some recognition. There is no doubt that the writer of the item you refer to knows little if anything about founding of metals and alloys, and the resultant product, castings. Somewhere along the line he has heard about cast iron, that "cheap, brittle" material, and the idea of making it malleable certainly had all the earmarks of being a noteworthy accomplishment —and hence, the hot-off-the-griddle blurb. A couple of minutes with an engineers' handbook, or an introduction to metallurgy, or an encyclopedia would have enlightened the writer of the item to no small degree.

Without the glamour and frills, the item refers to U. S. Patent 2,340,854 which was granted to Ziegler and Northrup for a method of producing malleable cast iron from a composition containing 1.5 to 3.5 per cent carbon, 0.5 to 2.5 per cent silicon, and not less than 94 per cent iron in the presence of a small but effective amount of lead up to 1 per cent of the mixture. For a number of years many have tried with more or less success to produce malleable cast iron in the shortest possible time, and it is well known that the higher the silicon content, the more rapid is graphitization. Unfortunately, silicon increase beyond certain limits results in primary graphite precipitation in the white iron which is not desired. Hence, if some agent could be added to a high silicon iron which would suppress the formation of primary graphite, and at the same time not interfere with the graphitizing action of the silicon during malleablization, one would be able to produce malleable cast iron in a much shorter time.

Tellurium has been suggested for such an agent, and there is no doubt that extremely small quantities of that ele-

(*Concluded on page* 138)

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(*Concluded from page* 136)

ment will produce white fracture iron. However, there evidently are other factors which militate against its application because as far as we know the practice is not in commercial use. Apparently the inventors mentioned in the patent have found that additions of lead function the same as tellurium in insuring a white fracture iron with high silicon which can be malleablized easily.

Make Sash Weights On a Squeezer

Q.—We are operating a small gray iron foundry where the sand is rammed by hand. On a production basis we are contemplating the manufacture of several types of castings including sash weights and pump liners 2 inches inside diameter, 3 inches outside diameter and 12 inches in length. We shall appreciate your advice on the best type of machine to handle these two jobs.

A.—So far as the molding is concerned, sash weights and 3-inch diameter pump liners 12 inches in length could be made on the same machine. For comparatively small quantities we assume you intend to mount split patterns on a board or plate. The molds can be made on a plain squeezer machine operated by compressed air. We suggest you get in touch with the various molding machine manufacturers whose names and addresses appear in the advertising pages of THE FOUNDRY.

While it is true that sash weights can be made in the manner indicated, still if you are not familiar with the fact, you may be interested to learn that a different technique is employed where sash weights are made in great numbers. The molds in tiers are made in special flasks. The patterns are pulled through holes in one end of the flask and the metal is dumped into a thin, flat sprue which delivers metal to all the mold cavities.

Substitute Sought For Chill Nails

Q.—We are seeking a substitute for chill nails used in foundry cores and molds for making gray iron castings. We will appreciate a solution for we find that using nails in castings as chills adds substantially to the production cost.

A.—Usual objective in using nails in cores and molds for gray iron castings is to obtain chilling or rapid cooling of the adjacent metal. In the case of steel, special nails and spirals are projected into the mold cavity which cools the molten metal as it surrounds and fuses them; also, external chills such as blocks and nails may be used, or nails may be used to minimize washing of mold or core. In gray iron, blocks may be used to chill or densen whole surfaces as in the case of some journals.

Unfortunately, your statement is ambiguous in that the second part refers to nails *in* castings. Such nails will not fuse in gray iron, and we doubt if you mean what you say. If so, we would hate to machine such a section, or to vouch for its soundness and strength either. Assuming that you want to cool a *surface* rapidly, it indicates a casting with decidedly unequal sections, or reentrant angles and hot spots. In either case it would be a good idea to look into the possibilities of redesign to eliminate or minimize the difficulty at its source. Also it may be possible to feed the hot spot by a suitable riser, or rearrange gating so that the first and coldest metal gets to the hot spot first.

If it is a case of light and heavy sections adjacent, first fillet carefully, and then consider an analysis which will produce dense iron in the heavy section without danger of chill in the light. Usual method is to select an analysis suitable for the heavy section, and add some agent such as copper, nickel, etc., to prevent chill in the light section. If the nails are used to prevent surface washing, better cores and better sand control will be helpful. Lately, in production of steel castings and bronze castings, use of about 2 per cent iron oxide in the sand has proved effective in many cases in producing mold surfaces which do not burn in.

Roll Is Annealed In the Mold

Q.—Recently we cast a crusher roll 18 inches outside diameter, 12 inches inside diameter and 30 inches in length, joined to a hub by two rows of 1½-inch cold rolled steel arms. The rim was poured first and the hub about an hour later. The order specified a white iron body and gray iron hub. The cupola charge contained 1400 pounds pig iron with a silicon content of 0.73 per cent, 600 pounds steel scrap and 10 pounds chromium. Analysis of metal taken from the rim gate showed total carbon 3.78 per cent, silicon 0.70 per cent, sulphur 0.059 per cent and chromium 0.36 per cent. The brinell hardness number on the face was only 232.

A.—We find it rather hard to understand how a casting could show a silicon content of 0.70 per cent, made from a cupola charge two thirds pig iron with 0.73 per cent silicon and one third steel containing practically no silicon. However, that is only incidental. In the present instance to get the full beneficial effect, the roll should be poured in a chill mold. Your roll was poured in a sand mold and then while it was still red hot the hub was poured on the inside. The casting then probably was left in the flask over night. The total result was a mild annealing of the body and marked reduction of hardness on the face. On any type of casting in which hub and rim are connected by steel spokes it is not advisable to pour the hub until the rim has cooled down to atmospheric temperature and contraction has ceased. When the hub is poured, usually on the following day, the contraction exerts a slight pull on the spokes and anchors them more tightly.

Brass Coupling Is Hard To Machine

Q.—We are sending to you a 1½-inch hose coupling which our customer claims is much harder to machine and thread than those received from other sources. Composition of the alloy is: Copper 78 per cent plus; tin 3 per cent plus; lead 3 per cent minus; zinc 15 per cent minus; iron 0.24 per cent; antimony 0.06 per cent and nickel 0.48 per cent. The alloy is melted in No. 200 crucibles in an oil-fired, tilting furnace, and pouring is around 2200 degrees Fahr. Sand is No. 2 Albany with 4½ to 5 per cent moisture. Cores are sharp sand-linseed oil mixture. We have tried various sands for cores and molding, and high and low pouring temperatures.

A.—Outward appearance of the coupling is good but that has nothing to do with the trouble you encounter since the latter is associated with composition and structure. While you do not mention it, we assume that you are using ingot metal, and the analysis quoted is that given by your supplier. However, it is quite possible that the alloy as poured into castings differs considerably from the composition shown for the ingot. Ordinarily, the alloy you mention should machine reasonably well, provided that the iron content is as stated, and the lead content is as close to 3 per cent as possible.

It is quite easy to increase the iron content of the alloy through careless use of iron stirring rods, and to volatilize 0.25 to 0.50 per cent or more of the lead in melting large quantities of the alloy. Your pouring temperature seems to be satisfactory, and the same applies to your molding practice from the evidence submitted. Consequently, the only other supposition is that the composition of the alloy is out of line. Hence, we suggest that you have analyses made of the ingot metal as charged, and the resulting metal as poured into castings. Compare the results, and see how much loss occurs through volatilization, how much iron is dissolved, etc. Then you will be better able to supply the proper correctives.

Prevent Blowing of Steel Inserts

Q.—We are having difficulty with steel inserts blowing in large aluminum casting. We have tried galvanizing, burning, washing with French chalk, sandblasting, etc., without results. There is no way to heat the chill.

A.—Careful attention to details to prevent defective work is required in castings containing inserts. Close attention to gating practice is essential, and the gate should be arranged so that the first metal entering the mold should flow toward the steel insert. Also the gate should be arranged so that the metal rises from the bottom of the insert to the top. Coating the chills with the smoke from an acetylene torch is beneficial. Also do not close the mold until ready to pour since that reduces the tendency for condensate to form.

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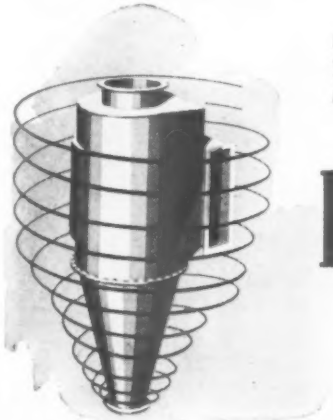

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SPLIT-DUCT MANIFOLDS	UNLIMITED CAPACITY	
	NO MOVING PARTS	
	FREE DUST FLOW	

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MEN ... of Industry

HERBERT A. REECE has been elected first vice president in charge of operations of the Meehanite Metal Corp. Mr. Reece was educated at the University of Virginia, joining the Meehanite Metal Corp. in 1929, and has served successively as metallurgist, chief metallurgist, assistant to the president, and manager. He is the inventor of the equalized-velocity process of cupola melting and of many methods of manufacture of specific property irons. Mr. Reece will continue to make his headquarters in Cleveland.

♦ ♦ ♦

Paul M. Snyder has been appointed sales manager of the Climax Molybdenum Co. His headquarters will be in Canton, O. Mr. Snyder joined the Central Steel Co., Massillon, O., in 1915, and upon its merger with United Alloy Steel Corp. to form the Central Alloy Steel Corp., he became part of the new organization. When Republic Steel Corp. absorbed Central Alloy, Mr. Snyder was made assistant to the vice president of the Republic Research Corp. He joined Climax Molybdenum Co. as a metallurgical engineer in 1932, and has been in charge of the company's sales and development work in the Canton area since that time.

♦ ♦ ♦

John L. Lowe has resigned as foundry engineer for Battelle Memorial Institute and the Gray Iron Research Institute Inc. to become assistant to the vice president in charge of operations, United States Pipe & Foundry Co., Burlington, N. J. That company operates foundries at Burlington, N. J., Addyston, O., Chattanooga, Tenn., Bessemer, Ala., and North Birmingham, Ala. Mr. Lowe received his bachelor of science degree in mechanical engineering from Michigan State College, East Lansing, Mich., in 1933 and his professional degree in mechanical engineering in 1938. While attending college he worked for the Saginaw Malleable Iron Co., Saginaw, Mich., and following graduation became connected with the Campbell, Wyant & Cannon Foundry Co., Muskegon Heights, Mich., where he worked through several departments to the position of production metallurgist and melting superintendent. When Centrifugal Fusing Co. was built at Lansing, Mich., as a subsidiary of Campbell, Wyant & Cannon, Mr. Lowe was made melting superintendent and metallurgist of the new plant. In 1939 he was made foundry manager of the Vilter Mfg. Co., Milwaukee, and in 1940 became connected with Battelle Memorial Institute.

♦ ♦ ♦

Cleve H. Pomeroy has been elected vice president of the National Malleable & Steel Castings Co., Cleveland. He will also continue as secretary and treasurer, the office he has held since 1936. Mr. Pomeroy joined the company in 1920 as credit manager. He became assistant treasurer in 1926, treasurer in 1935, and was elected a director in 1938.

♦ ♦ ♦

W. Harvey Payne, former president and founder, the Hydro-Arc Furnace Corp., La Grange, Ill., has opened an office in the Board of Trade building, Chicago, to engage in consulting work in electric furnace design, plant layout and operation, as well as to continue as Chicago district representative of the Foundry Equipment Co., Cleveland, in sales of core and mold ovens and foundry supplies. Mr. Payne sold the patents and assets of his electric arc melting furnace business to Whiting Corp., Harvey, Ill., last December, and now serves the latter on a consulting basis.

♦ ♦ ♦

Daniel E. Lehane resigned Jan. 31 as metallurgist, Trafford Foundry, Westinghouse Electric & Mfg. Co., and has been succeeded by **Donald W. Gunther.** Mr. Gunther was graduated from Colorado School of Mines in 1939 and joined the Westinghouse graduate student course in 1940. The following year he was transferred to the Trafford foundry shops, first in quality control and subsequently as foreman of the foundry coreroom. Mr. Lehane now is associated with the metallurgical staff of Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

♦ ♦ ♦

Charles W. Sprenger has been appointed manager of the metropolitan New York district for the Carborundum Co., Niagara Falls, N. Y., succeeding the late John Storm. Mr. Sprenger recently had been general industrial sales representative in that area. **Joseph C. Steele** has been appointed district sales office manager at New York, succeeding E. W. **Martin** who has been named regional sales office manager of the eastern sales district.

♦ ♦ ♦

J. D. Glatz, for the past 2 years chief of the Crane and Hoist Section, Tools Division, WPB, Washington, has returned to the Harnischfeger Corp., Milwaukee, to manage a separate division established recently by the latter to handle business in repair and replacement parts for all of

(*Continued on page* 142)

HERBERT A. REECE

PAUL M. SNYDER

JOHN L. LOWE

CLEVE H. POMEROY

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WOODWARD IRON COMPANY

Woodward, Alabama

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(*Continued from page* 140)
the company's products. Prior to going to Washington, Mr. Glatz was Harnischfeger representative in the Chicago area.

♦ ♦ ♦

Wilfred H. White has been appointed metallurgist for the Jackson Iron & Steel Co., Jackson, O. Recently he had been chief of the Tungsten Section, Ferro-Alloys Branch, War Production Board, Washington. Mr. White was graduated from Antioch College in 1929. After 3 years as chemist with E. I. du Pont de Nemours & Co. in Buffalo he joined the Jamestown Malleable Iron Corp., Jamestown, N. Y., handling chemical and metallurgical work until 1942 when he joined WPB.

♦ ♦ ♦

T. C. Weiser, recently elected president of the New England Foundrymen's Association, is superintendent of the Chelsea, Mass., plant of the Griffin Wheel Co. Mr. Weiser has been identified with the foundry industry since 1907 when he joined the Griffin Wheel Co. as a stenographer. Since that time he has worked in various positions in the accounting and operating departments. Appointed superintendent in 1919, he has served in that capacity at Griffin's Council Bluffs, Iowa, plant as well as at Chelsea.

♦ ♦ ♦

Leon F. Miller has been appointed sales manager of the Machine Division of the Osborn Mfg. Co., Cleveland, succeeding **Russell F. Lincoln,** resigned. Trained at the Case School of Applied Science, Mr. Miller joined Osborn in 1929 as a junior engineer in the Machine Division. In 1934 he was assigned to field work, specializing in sand handling and treating equipment, and since 1935 has devoted his entire time to foundry molding machines.

♦ ♦ ♦

Frank J. Stanley has been appointed plant manager of the Lebanon Steel Foundry, Lebanon, Pa., succeeding **Henry D. Phillips** who has resigned to accept a commission in the U. S. Navy. For the past 4 years Mr. Stanley had been plant superintendent, and prior to joining Lebanon he had 25 years operating experience in the steel foundry industry.

L. G. Miller, who has been associated with Lebanon Steel Foundry since 1925—for the past several years as chief inspector and assistant to the plant manager—assumes Mr. Stanley's former position as plant superintendent.

♦ ♦ ♦

Nick Zins who confidently expects to celebrate his 92nd birthday anniversary next September was the guest of honor at a party Feb. 19 staged by the members of Local 218, International Molders and Foundry Workers Union, Cleveland, of which he is corresponding secretary. He was born in Pittsburgh in 1852 and following the footsteps of his father joined the Iron Molders Union in 1874. He was too young for the Civil War and too old for the Spanish War, a feature to be regretted since he would have been an ideal Marine. Members of this famous corps modestly admit they have been in every place and clime that men could drag a gun. Nick has worked in every one of the 48 states, as well as in Canada, Mexico and in Europe.

♦ ♦ ♦

Robert W. Lindsay, research metallurgist, Sealed Power Corp., Muskegon, Mich., has resigned to join the faculty of the School of Mineral Industries, Pennsylvania State College, State College, Pa., as assistant professor of metallurgy.

♦ ♦ ♦

A. W. Demmler, formerly metallurgical engineer, Vanadium Corp. of America, is now director of metallurgy and research, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

♦ ♦ ♦

Edward A. Kreller, formerly works manager, Detroit Alloy Steel Co., Detroit, has been appointed manager of the cast to shape department, Jessop Steel Co., Washington, Pa.

Philip H. Clapp has been appointed abrasive division district manager for the Pacific coast by Norton Co., Worcester, Mass. He will make his headquarters in Los Angeles. Mr. Clapp has been with Norton Co. for 30 years and since 1935 has been district manager in Detroit. Previously for many years he was the Norton abrasive engineer in the California area. **Donald L. Price** succeeds Mr. Clapp at Detroit. Associated with Norton Co. for 24 years, Mr. Price has been located in the Detroit district since 1926 as field engineer and abrasive engineer.

♦ ♦ ♦

Wallace Levi, metallurgist, Lynchburg Foundry Co., Lynchburg, Va., and **Dr. R. A. Flinn** of the Mahwah, N. J., research laboratory of American Brake Shoe Co., have been appointed to the technical committee of the Gray Iron Founders' Society. Other committee members include: Edward L. Roth, Motor Castings Co., Milwaukee, chairman; Frank J. Dost, Sterling Foundry Co., Wellington, O.; R. D. Phelps Jr., Francis & Nygren Foundry Co., Chicago, and Donald J. Reese, WPB and the International Nickel Co.

♦ ♦ ♦

George R. Lundberg has been appointed by the Osborn Mfg. Co., Cleveland to succeed **W. T. Glendinning** in the power brush manufacturer's northern Michigan territory. The latter has gone to Detroit to direct sales and service there. **C. R. Walker,** the former Detroit representative, now is in charge of the northern Ohio territory, replacing **D. A. Simison.**

♦ ♦ ♦

Neil C. Hurley has been elected chairman of the Independent Pneumatic Tool Co., Chicago, and **Neil C. Hurley Jr.** has been elected president. The latter has been associated with the company for 12 years, following his graduation from Notre Dame University. Since his managership of the company's electric tool division, Mr. Hurley has served

(*Continued on page* 144)

WILFRED H. WHITE

T. C. WEISER

FRANK J. STANLEY

LEON F. MILLER

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(*Continued from page* 142)

successively as secretary, vice president and executive vice president. **Edward G. Gustafson,** treasurer, and **John McGuire,** secretary, have been elected directors.

♦ ♦ ♦

Anthony A. Mulac has been appointed an assistant director of the Tools Division, War Production Board, in charge of the Industrial Specialties Branch. Since last September Mr. Mulac had been chief of this branch, which includes sections handling foundry equipment and supplies in addition to various other types of machinery and equipment.

♦ ♦ ♦

Lyman C. Thunfors, formerly assistant to the factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill., has joined the Richmond Radiator

LYMAN C. THUNFORS

Co., Uniontown, Pa., as manager of production and manufacture. Mr. Thunfors served his apprenticeship as a patternmaker with the Howe Chain Co., Muskegon, Mich., and was associated with the Lakey Foundry & Machine Co., Muskegon, prior to joining the Caterpillar Tractor Co.

♦ ♦ ♦

Dwight R. Means, associated for 21 years with the Columbia Chemical Division of the Pittsburgh Plate Glass Co., Pittsburgh, has been named assistant to the vice president. Recently he had been technical director and previously had served as research director and assistant superintendent.

♦ ♦ ♦

W. H. Moore has been appointed technical manager of the Meehanite Metal Corp. in India. Manufacturing rights for meehanite castings have been granted to the Indian Hume Pipe Co., Wadala, Bombay, India.

♦ ♦ ♦

Dr. Ora S. Duffendack, recently professor of physics at the University of Michigan, has been appointed director of research of North American Phillips Co. Inc., New York, manufacturer of electronic products, and is establishing scientific laboratories for the company at Irvington, N. Y.

♦ ♦ ♦

Lewis P. Wilson, since 1940 associated with Aluminum Co. of America as a metallurgist, six months in Cleveland and two and one-half years in Detroit, has joined the Oscar W. Hedstrom Corp., Chicago, nonferrous alloy foundry, as metallurgist. For a period while in Detroit he served as assistant foreman of the melting department. He received his metallurgical training at Fenn College, Cleveland, graduating in 1938.

♦ ♦ ♦

A. H. Freeman has joined R. L. Orth in representing the American Foundry Equipment Co., Mishawaka, Ind., in the Detroit territory, filling the post vacated by the death of M. T. Mortensen. Mr. Freeman has been with the company since 1918 and during the past 7 years acted as sales representative in the northern Indiana and southern Michigan areas.

♦ ♦ ♦

John K. McBroom, formerly vice president and general manager, Hydro-Arc Furnace Corp., LaGrange, Ill., which was acquired by the Whiting Corp., Harvey, Ill., last December, has associated himself with the latter company as sales manager of the new electric furnace department.

♦ ♦ ♦

D. H. Herbster has been appointed vice president and general manager of the Neff & Fry Co., Camden, O., manufacturer and builder of bulk material storage bins. Mr. Herbster has been associated with the company for the past 6 years.

♦ ♦ ♦

S. L. Feduska, since last September research metallurgist of Indiana Steel Products Co., Valparaiso, Ind., has been appointed plant metallurgist in charge of the foundry, heat treating and forging departments. Mr. Feduska was graduated

S. L. FEDUSKA

from the University of Pittsburgh in 1934 with a degree in metallurgical engineering, and was assistant to the director of metallurgy, Continental Roll & Steel Foundry Co., until 1936 and research metallurgist and metallurgical engineer with United Engineering & Foundry Co., Pittsburgh, until he joined Indiana Steel Products Co.

♦ ♦ ♦

Robert L. McIlvaine, manager of engineering sales, National Engineering Co., Chicago, has been made a vice president and general sales manager of the company. Mr. McIlvaine was graduated from the University of Illinois in 1925, and following a short period as cupola foreman for Griffin Wheel Co., he was associated with his father as foundry engineer in R. W. McIlvaine Co. In 1930 he became president of McIlvaine Foundry Conveyors Co. Inc.,

R. L. McILVAINE

and from 1933 until joining National Engineering Co. in 1941, Mr. McIlvaine was chief engineer and sales manager of Swayne Robinson Co., Richmond, Ind.

♦ ♦ ♦

Lyman D. Warner has been appointed sales manager of the Crocker-Wheeler Division, Joshua Hendy Iron Works, Ampere, N. J. Assistant sales manager since 1941, Mr. Warner has been with Crocker-Wheeler since 1937 and previously was associated with Ingersoll-Rand Co. and General Electrc Co.

♦ ♦ ♦

Fred T. Goes, formerly vice president of the Vilter Mfg. Co., Milwaukee, has been elected president, succeeding the late William O. Vilter. **William B. Vilter** succeeds Mr. Goes as vice president and continues as director of personnel.

♦ ♦ ♦

A. H. Kean has been appointed general manager of the Edward A. Lynch Machinery Co., Ardmore, Pa. Mr. Kean previously had been associated with the Bridgeport Safety Emery Wheel Co., Bridgeport, Conn. He joined the latter

(*Concluded on page* 146)

SAVE TIME { THESE 3 WAYS }

"Get better castings, too—"

1 GET FASTER FORMING!

Truline cores ram quickly, giving dense cores with freedom from sagging. *This means more cores per hour per core maker!*

2 GET FASTER BAKING!

Truline cores harden under low oven heat, dry without oxidation. Oven-time is less, output greater!

3 GET FASTER CLEANING!

Truline cores burn out readily. Core sand shakes out easily, saving valuable clean-up time.

NOWADAYS the problem is speed—and more speed. Usually with incompletely trained personnel. What's more, most war work is in castings of high-shrinkage metals.

Many foundries are finding the answer to these production problems in Truline Binder. To begin with, Truline is faster all along the line. (See 1, 2, and 3.) But even more important, Truline-bonded cores collapse quickly, thus eliminating the danger of "hot-tears." For further information about Truline, write Hercules. Use the coupon at the right. No obligation.

TRULINE BINDER

Reg. U. S. Pat. Off.

HERCULES POWDER COMPANY
INCORPORATED
999 Market St., Wilmington 99, Delaware

Please send ☐ sample ☐ information on how to use Truline Binder in casting:

.....
(state type of work and kind of metal cast)

.....

Name _____ Title _____

Company _____ City _____ State _____ NB-43

Address _____

(*Concluded from page* 144)

company in 1916 as treasurer, continuing as an officer until last September when he disposed of his interest and became sales manager.

♦ ♦ ♦

C. William Anderson has been elected president and treasurer of the Specialty Brass Co., Kenosha, Wis. Other officials elected include: Chairman, **Charles M. Anderson;** secretary, **E. H. Kleist;** vice president, **N. J. Anderson;** director, **Clarence Anderson,** and company office manager, **John Skuhra.**

♦ ♦ ♦

Frank J. Hirner has been appointed manager of the St. Louis district for the Harnischfeger Corp., Milwaukee. Formerly manager of the welding division, Mr. Hirner recently was located in the Chicago branch office.

♦ ♦ ♦

Floyd C. Bowman, treasurer of the Ohio Steel Foundry Co., Lima, O., has been elected president of the Lima Association of Commerce.

♦ ♦ ♦

John H. Bemis, chief of the Pig Iron Section, Steel Division, War Production Board, has resigned to return to Pickands Mather & Co., Cleveland.

♦ ♦ ♦

J. Richard Adams, works manager of the Crucible Steel Casting Co., Lansdowne, Pa., has been elected vice president in charge of operations.

♦ ♦ ♦

E. B. Dunkak has been appointed manager of the newly formed Process Division of the Davison Chemical Corp., Baltimore.

VAUGHAN C. REID

In charge of the metallurgical department of City Pattern Foundry & Machine Co., Detroit, who has been elected a vice president, as reported in THE FOUNDRY for December.

F. M. WITTLINGER

Secretary and general manager, Texas Electric Steel Casting Co., Houston, Tex., who recently was elected the first chairman of the new Texas Chapter of the A.F.A.

Official of Robins Conveyors Honored

William P. Newman, for 36 years purchasing agent of Robins Conveyors Inc., Passaic, N. J., recently was honored at a luncheon celebrating his 45th anniversary with the company. Present were 16 people who had spent a total of 400 years with Robins. Years of service of those shown above at the gathering follow: Left to right, standing—H. Von Thaden, vice president (21 years); E. C. Salzman, vice president (34 years); T. M. Keith (34 years); T. Webster Matchett (11 years); R. W. Eichenberger, vice president (34 years); E. S. Stadelman (36 years). Left to right, seated—Thomas Matchett, president (31 years); Mr. Newman (45 years); Thomas Robins, chairman of the board (53 years); Thomas Robins Jr., chairman of the executive committee (25 years)

Alton P. Hall has been appointed assistant general manager of sales of American Chain & Cable Co. Inc., Bridgeport, Conn. Mr. Hall had been associated with Bethlehem Steel Co. since 1922, for the past 6 years as assistant manager of sales of the New York office.

♦ ♦ ♦

Charles Schwarzler has been appointed manager of the export department, the Foxboro Co., Foxboro, Mass., succeeding the late Henry B. Moelter. Mr. Schwarzler formerly was manager of the sales promotion department.

♦ ♦ ♦

Howard C. Renken, recently associated with the Stauffer Chemical Co., San Francisco, has been named to the research staff of Battelle Memorial Institute, Columbus, O., and assigned to its division of mineral dressing research.

♦ ♦ ♦

Dr. John M. Schweng has joined Turco Products Inc., Los Angeles, as chemical research engineer and director of bacteriological research. Previously he had been chemical research engineer with Lockheed Aircraft Corp.

♦ ♦ ♦

Martin J. Lefler, formerly connected with the Western Foundry Co., Chicago, has resigned and is now managing and has an interest in the Strom Brass Foundry, Elkhart, Ind.

♦ ♦ ♦

Lester J. Nichols, secretary and assistant treasurer of the Malleable Iron Fittings Co., Branford, Conn., recently celebrated his 95th birthday. He has been associated with the company 78 years.

♦ ♦ ♦

A. A. Asher, vice president and eastern sales manager of Electro Refractories & Alloys Corp., Buffalo, has been elected a director. Mr. Asher's headquarters are in New Haven, Conn.

♦ ♦ ♦

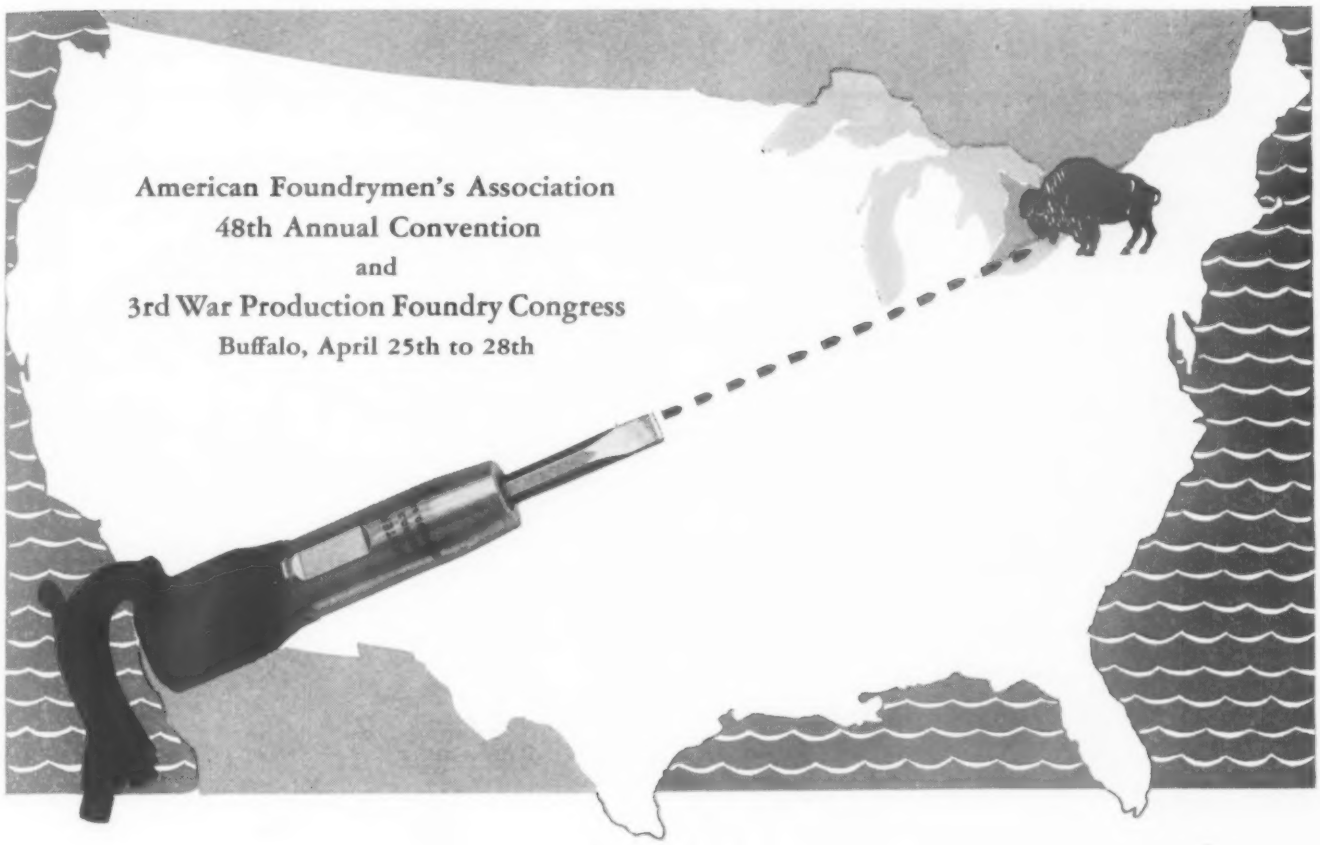
H. P. Owen, for the past 10 years sales engineer, Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago, has become associated with Sterling Tool Products Co., Chicago, as district manager.

♦ ♦ ♦

James J. Nelson, general manager of the Cramp Brass & Iron Foundries Division of Baldwin Locomotive Works, Philadelphia, has been appointed vice president of the division.

♦ ♦ ♦

A. C. Tishacek, for the past 2 years works manager, the Sivyer Steel Casting Co., Milwaukee, has been appointed vice president in charge of operations.



We'll be there to tell you all about MASTER TOOLS

Look for us when you visit the American Foundrymen's Association 48th Annual Convention and Third War Production Foundry Congress held at Buffalo, April 25th to 28th.

We shall be happy to show you the complete line of Master Tools—chipping hammers, floor rammers, chisels and perhaps a couple of new tools—to show them in operation—and to tell you what they are doing in foundry service to help overcome the industry's man-power shortage.

This is YOUR INVITATION—we'll be expecting you.

Literature and prices on any Master Tool or on the rebuilding of any make of pneumatic tool to Master Standards – sent on request.

STERLING

THE WHEELS OF INDUSTRY

Here, We Turn on the Heat and Help Defeat the *Axis*

A request on your letterhead will bring your copy of Sterling Catalog No. 43. Send for this useful 80-page book today . . . it is free!

Continually traveling through Sterling tunnel kilns are thousands of "Wheels of Industry" destined to do their share in speeding up production for today's war and tomorrow's peace. So great has been the demand for Sterling Grinding Wheels that another tunnel kiln was recently placed in operation. Now, even quicker deliveries can be promised!

Sterling workers know that every extra load of wheels they push into our kilns brings victory closer. These are the wheels that are the combined effort of Sterling laboratory technicians, grinding engineers, and plant workers . . these are the wheels that will speed the production of landing barges, planes, trucks, guns, and other equipment in hundreds of factories all over our country.

Every Sterling wheel is planned to do a particular grinding job well. In your own plant, we can possibly recommend a wheel that will solve one or more of your troublesome grinding problems. May we make a grinding survey at no obligation? Our engineers will gladly cooperate upon request.

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

TIFFIN, OHIO

THE WHEELS OF INDUSTRY

ALABAMA FOUNDRYMEN

Hold Annual Conference

TWELFTH annual foundry practice conference of the Birmingham Chapter of the American Foundrymen's Association, held at the Tutwiler Hotel, Birmingham, Feb. 18, attracted approximately 400 persons to the two technical sessions and banquet which constituted the program.

"Factors Affecting the Mechanical Properties of Cast Iron" was the subject of a talk given at the first technical session by Victor A. Crosby, Climax Molybdenum Co., Detroit. He pointed out that the properties of cast iron of constant composition depend on: Inherent properties of the raw materials used; thermal treatment in melting and processing; graphite pattern obtained in the gray iron; alloying elements used; pouring temperature, and heat treatment.

Mr. Crosby gave the composition of various charges which produced cast iron of almost identical chemistry and graphite size and distribution but of considerably different physical properties. To the metallographist, the speaker emphasized the importance of the proper polishing technique when examining graphite size. By means of slides he showed how improper polishing technique may result in the graphite size appearing much larger than it actually is.

Carbon Affects Properties

Physical properties as affected by thermal treatment in melting and processing were illustrated by slides showing that both high temperature and correct processing are necessary for the optimum properties. Variations in tensile property of 29,000 to 50,000 pounds per square inch were obtained in this manner. The speaker emphasized the importance of graphite pattern on the mechanical properties of gray iron by showing micrographs and data to substantiate the correlation. Improvements in the order of 25 per cent were not unusual when random type graphite was obtained.

In answer to the common question as to proper pouring temperature, Mr. Crosby said that it depends entirely upon the kind of iron to be made, and that low strength irons of 20,000 to 30,000 pounds per square inch are rather immune to pouring temperature effects in the range of 2800 to 2350 degrees Fahr.

Attention was called to the effect of alloys on the mechanical properties of iron by showing data on 13 alloyed irons of the single-dual and triple alloy types of low alloy content in a base iron of general commercial analysis. It was shown that alloying elements have independent effects and that a knowledge of the properties desired should precede the selection of an alloying element or combination of elements. The speaker stressed the value in enhancing tensile strength of using a small amount of three alloys rather than a similar total amount of one element.

Heat treating cast iron by a quench and a draw at about 900 degrees Fahr. will increase its tensile strength. The quench in itself increases its hardness. Reasons for heat treating cast iron may be enumerated as: 1. Aging and stress relieving; 2. annealing for machining; 3. malleablizing; 4. hardening.

J. E. Reynolds, metallurgist, U. S. Pipe & Foundry Co., served as leader in the ensuing discussion.

C. E. Bales, vice president, the Ironton Firebrick Co., Ironton, O., was the principal speaker at the second technical session, discussing "New Developments in Foundry Refractories." Mr. Bales explained the fundamental properties of silica and fire clay brick and their uses in foundry furnaces, and described briefly the manufacture and applications of magnesite, chrome and mullite refractories.

The speaker stressed the use of superquality refractory bonding mortar for use in laying cupola blocks in the well and melting zone, for laying brick in bricklined ladles, for laying up high alumina and super-duty fire clay brick in electric furnaces and for laying bung and side wall brick in malleable furnaces. Slides were shown to illustrate installations of plastic ramming refractories in desulphurizing ladles and to demonstrate superiority of this product over regular fire brick or shape.

Considerable discussion ensued on the use of siliceous ramming refractories for use in acid electric furnace bottoms and for lining ladles handling gray iron, malleable iron, alloy iron, and electric furnace steel. It was pointed out that this type of refractory also is useful in side-blow bessemer converters. A mixture of siliceous ramming refractory with ganister of the proper grain size was reported to have been given 120 blows in a 1½-ton converter, compared with 65 blows on a regular ganister clay mixture. In 3-ton ladles handling electric steel, the service life of siliceous ramming refractory mixed with the proper type of ganister was reported to have been giving an average of 110 heats.

J. A. Bowers, melting superintendent, American Cast Iron Pipe Co., led the discussion following Mr. Bales' talk.

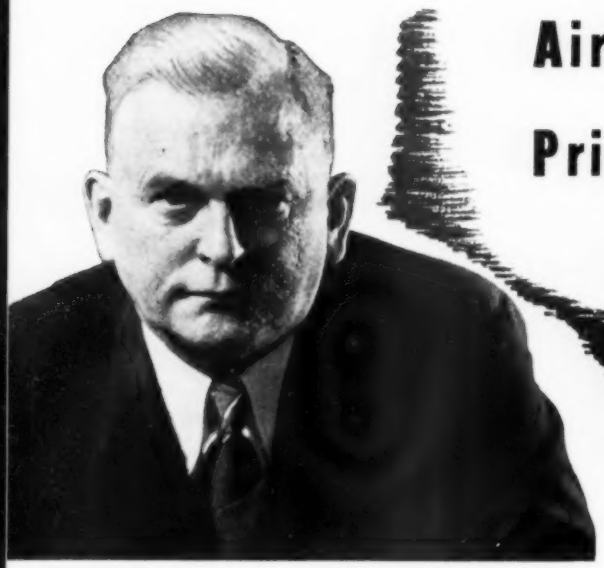
The annual banquet concluding the conference was presided over by W. Carson Adams, chairman of the Birmingham Chapter, who introduced chapter officers and directors. Lester N. Shannon, vice president of the Stockham Pipe Fittings Co. and former national president of the A.F.A., outlined briefly the history of the association.

Dr. Raymond R. Paty, president of the University of Alabama, in giving the principal address at the banquet, told his audience that the retooling of machines at the close of the war will be a much easier task than conversion of men. He asserted that education and democracy are synonymous and that education and industry should face together the problem of rehabilitating millions of veterans when they return home from the war. Dr. Paty praised the foundry industry for its part in the conversion to all-out war production, but warned that the havoc of haphazard reconversion is the sort of thing that can wreck the economy of the greatest nations.

Equipment Sales Off

Foundry equipment sales dipped in January to 378.3 per cent of the 1937-39 monthly average, according to the Foundry Equipment Manufacturers Association. The December index was 442.8, compared with 388 in November and 429.8 in January, 1943.

CONFERENCE SPEAKERS: C. E. Bales (left), Ironton Firebrick Co. and Victor A. Crosby (right), Climax Molybdenum Co., were principal speakers at technical sessions of the twelfth annual foundry practice conference held by the Birmingham Chapter of the A.F.A., Feb. 18



Airless Wheelabrator Tumblast Principle *CUTS TIME* and *COSTS* on metal cleaning operations in our plant!

"WE use two 48" x 42" Wheelabrator Tumblasts for cleaning a wide variety of hard and malleable iron castings.

"Malleable castings weighing 0.1 to 52 lbs. each are cleaned in these machines at the rate of 60 tons per 8 hour shift. Loads averaging 895 lbs. each are cleaned in 4.97 minutes. Total cleaning cost amounts to $.643 per ton.

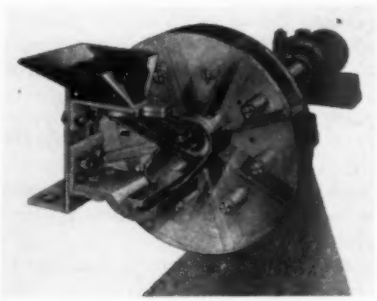
"Hard iron loads averaging 858 lbs. require only 1.96 minutes under the blast. Cost of cleaning totals $.852 per ton including fixed charges, repairs, power, abrasive, and maintenance and operating labor.

"Production is much faster and costs are much lower than our former method."

WHEELABRATING is a centrifugal mechanical method of abrasive blasting that eliminates the use of compressed air. The Wheelabrator unit shown below does the work. It eliminates costly pressure tanks, hose, nozzles, control valves, mixing chambers, air compressor, compressor motor and air receiver.

Wheelabrating is very simple. Abrasive is thrown by centrifugal force from the blades of the wheel upon the work being cleaned or prepared.

Up to 300 pounds of abrasive per minute are thrown by the wheel in a continuous stream . . . this greatly exceeds the amount thrown by three 3/8" nozzles using 90 pounds air pressure.



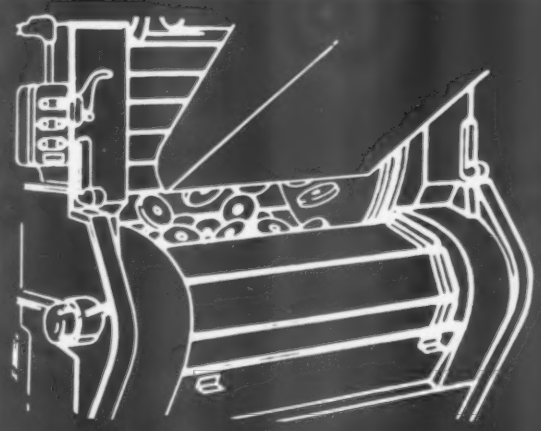
Any type of finish can be obtained by proper selection of the size and type of abrasive.

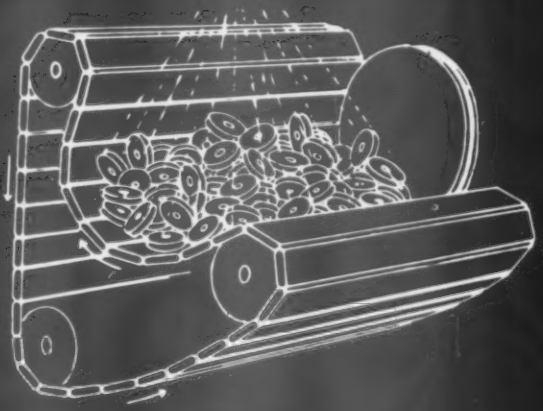
American

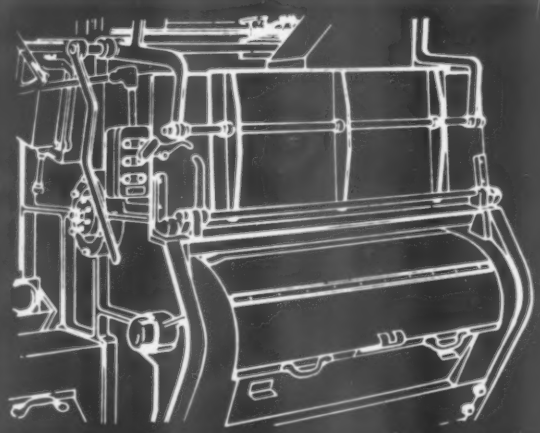
FOUNDRY EQUIPMENT CO.

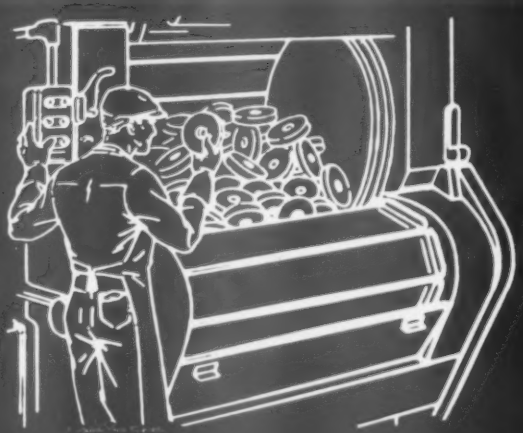
505 SOUTH BYRKIT ST. MISHAWAKA, IND.

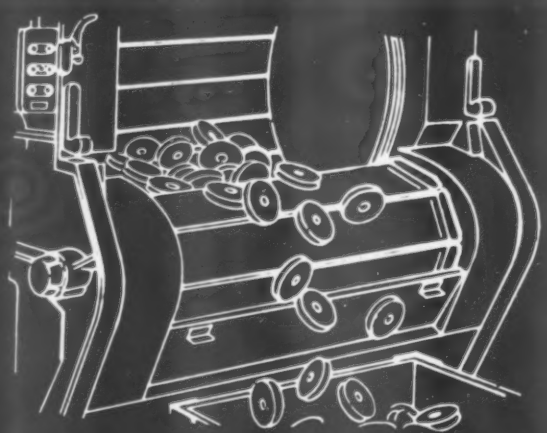
World's Largest Builders of Airless Abrasive Blast Equipment

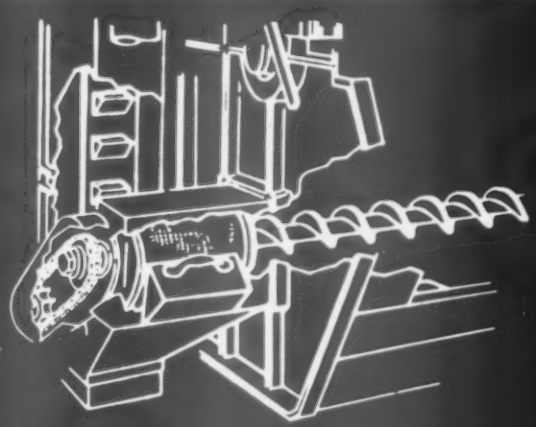












around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Buick to reopen Flint gray iron foundry, first of large automotive units to resume since 1942 shutdowns. . . . Additional aluminum casting requirements indicated for new and more powerful aircraft engines. . . . Breakdown of oven provides clue to cause of defective cores and rejected castings

PLANS are proceeding for the reopening of the Buick gray iron foundry in Flint, which will be the first of the large automotive gray iron foundries to dust off the cobwebs after closing in 1942. It is not known definitely just how much of the capacity will be resumed, but probably not too much, since it is a large plant with six 27-ton-per-hour cupolas, extensive convey equipment, elaborate sand handling and conditioning system, and a large area formerly devoted to centrifugal casting of brake drums. At the moment, it appears the principal production will be cylinder heads and blocks for engines to be used in landing craft, although it may be possible that some castings for Buick service parts could be included. This work has been farmed out in recent months, a York, Pa., foundry supplying engine castings for service requirements.

Remelt Aluminum Scrap

A portion of the Buick gray iron foundry has been occupied by four reverberatory furnaces for remelting aluminum scrap produced in the adjoining cylinder head foundry. With the decision to resume gray iron production, it became necessary to dismantle these units and it was up to the Defense Plant Corp. to determine how to dispose of them. Latest word is that buyers had been found for at least three of the units, one going to Dayton, O., and two others to Detroit. Two large remelt furnaces are operated in the aluminum foundry proper.

Additional work is in prospect for the Buick aluminum foundry which has been supplying both Buick and Chevrolet with cast aluminum heads for Pratt & Whitney radial engines built in Chicago and Tonawanda, N. Y. For one thing, a new and more powerful 18-cylinder P&W engine is going into production. The new engine requires major changes in tooling which will take about 6 months to effect. Design changes and supercharging bring the engine rating close to if not at the point where it supplies 1 horsepower per 1 cubic inch displacement per 1 pound of weight.

First reports indicated a forged aluminum head would be incorporated in the design, but as the weeks go by the forged head does not appear to be living up to all the flowery advance notices which were sent out a year ago. In fact, certain phases of the production of forged aluminum heads are reported to have been shut down, suggesting that the enormous production facilities set up for casting these heads may not be obsoleted as soon as was once thought.

Another prospect is that Buick may take on some of the aluminum castings requirements for the in-line Rolls-Royce aircraft engine, now being built in volume by Packard at Detroit and Toledo, and in the early stages of manufacture by Continental Aviation at Muskegon. Plans are being developed for an astounding new version of this engine which Packard will build, and additional castings sources will be necessary. If Buick is to assume a portion of this job, some major changes in equipment will be required in the Flint foundry which so far has produced nothing but the cast finned head.

If anyone wonders where all the aluminum cylinder heads now being produced in this country are going, let him pause to consider that January production of aircraft engines totaled 22,627, with total horsepower including spares of 36,098,000, or close to 1600 horsepower average. And if that is not enough, consider that total 1943 production of engines reached 226,561, with a gross horsepower of 339,538,000. Of these engines probably two-thirds are radial types, the rest in-line. On top of this there may be as high as 40 per cent spare heads shipped with some combat engine types.

Plans are being drawn for an extension to the Pontiac gray iron foundry to house two more cupolas, with the hope that it may be possible to get the building structure erected before the postwar rush to resume production of automobile castings. Not much difficulty is expected in obtaining delivery of equipment, once the building is ready.

Cadillac's plans for installation of centrifugal casting equipment to produce cylinder sleeves or barrels appear dormant at the moment, as well as the program for changes in the gray iron production equipment.

Decrease Cupola Diameter

Packard is giving consideration to the feasibility of resuming a limited production of gray iron, probably for cylinder blocks, but on a basis of only a few tons per day. To hold down production to this extent in one of its present cupolas would call for building up the lining to something like 27 inches, giving rise to the old argument as to whether it is possible to operate a cupola with a lining as thick as this without inordinate losses in refractories and excessive maintenance. There are experts on both sides of the fence.

How the merest accident can occasionally spot foundry troubles which have escaped the probing of the most capable engineers was demonstrated here recently in the Ford foundry where the appearance of fins on certain centrifugally cast steel parts was causing rejects as high as 35 per cent. Examination of the rejected castings showed porosity in the metal below each of the unwanted fins. Obvious explanations of the fins was that the sand cores used on the job in some way were cracking, thereby admitting molten metal which pulled away from the rest of the casting and left a void just below the fin.

Many variations were tried in core-making procedure, but still the fins per-

(*Concluded on page* 154)

MEN AND MATERIALS

"Supervisory experience teaches that people are like materials—like steel, cast iron, copper, zinc, aluminum, tin, magnesium, wood, cement and clay—all useful in certain places, but much more useful in some than in others. While we can change iron into a wide variety of materials, ranging from stiff, brittle castings to flexible, tough springs, we won't get very far if we try to make iron into aluminum. There are limits beyond which no material can be changed.

"Likewise, there are limits to the changes we can make in human beings."—*Ralph L. Lee, General Motors Corp.*

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

The fact that the production of war materials has reached its peak provides no basis for the assumption that manpower problems soon will cease to exist. The demand by the Armed Forces for men and women continues to be great. In industry, the tendency must be toward an increased number of women workers and older men. In this period, more than ever before, it becomes necessary to mechanize the handling of materials through processing, storage, shipping, and, in fact, wherever possible — to minimize lifting, pushing, and excessively fatiguing effort. Here, Mathews Engineering can help as it has done in thousands of great American and Canadian war plants during this emergency. Your Mathews Engineer can show you how modern Mathews methods can conserve manpower and promote economy in the materials-handling phase of your manufacturing.

MATHEWS CONVEYER COMPANY

ELLWOOD CITY, PENNSYLVANIA

If you are manufacturing wa material, or anything vit to the success of the wa effort, you can get Mathew Conveyers to handle tha material. Rely as usual o your Mathews Engineer

(*Concluded from page* 152)

sisted. One day there was an unexpected breakdown in the corebaking oven equipment which contained a load of cores for the centrifugal castings, resulting in a sharp temperature loss even before it was up to heat. The breakdown was repaired and the oven brought up to the standard baking temperature. When these cores were placed in the centrifugal molds and castings spun, inspection showed not a single finned piece or reject.

Thus was provided a valuable clue to the vexing trouble and it was finally deduced that it was all a matter of how fast the cores were brought to baking temperature. When immediately heated to the baking temperature, the core oil set before moisture in the sand had a chance to be driven out, resulting in cracking because of the moisture pressure. With a two-heat baking cycle—a soak at around 230 degrees followed by the regular baking temperature, the moisture was driven off in the low-temperature soaking and the core oil set at the higher temperature, avoiding any cracks resulting from entrapped moisture. Setting this up as standard corebaking practice resulted in rejects dropping to less than 5 per cent.

Festive occasion late in February was the entertainment of employes and families by General Foundry & Mfg. Co. at the dedication of a new recreation room, lunch room, locker room and shower baths in an addition to the plant. Feature of the evening was the presentation to employes of an oil painting of Hubbard's *The American Molder*, executed by Miss Betty Thomson, art student at Flint's Northern High School, and presented by A. D. McCaughna, president of General Foundry.

Two other smaller paintings of the same subject were presented to Mr. McCaughna and C. W. Bonbright, vice president, these also being the work of high school students. Acceptance of the larger painting in behalf of employes was made by Marvin McVicker, president of the employes' UAW/AFL union.

Mr. McCaughna announced the organization of a labor-management committee at the plant, and introduced the five employes' representatives. General Foundry was one of the first foundries in the Flint area to be classified with a preferential rating in the procurement of manpower and equipment, and holds the distinction of having worked continuously without layoffs every regular working day excepting holidays for nearly 7 years. A modernization program now is in process which includes continuous molding, iron pouring and shakeout on a conveyor, together with a continuous sand conditioning system.

AMERICAN MOLDER: Marvin McVicker (left), president of local 156, UAW-AFL, at plant of General Foundry & Mfg. Co., Flint, Mich., and A. D. McCaughna, foundry president, standing before painting of "The American Molder," the work of Miss Betty Thomson, student at a Flint high school. The picture was presented to employes of the company at recent ceremonies dedicating a new employes recreation room, lunch room, locker and shower room at the plant. It is adapted from the work sculptured by Frederick C. Hibbard as the trade mark of American Foundry Equipment Co.

Reports on Foundry Dust Hazards

Department of Labor and National Service, Melbourne, Australia, has published a brochure entitled, "Dust Hazards in Australian Foundries", by A. A. Ro.s and N. H. Shaw, which reports results of dust sampling in 15 foundries. Four of the foundries were casting steel, six gray cast iron, two malleable cast iron, and three ferrous and nonferrous metals.

New Film Portrays Nickel Production

A new Bureau of Mines educational film entitled "Nickel and Nickel Alloys" now is available for free public distribution. It portrays the production of nickel from the crude matte to finished products. Applications for the 16-millimeter sound film, which can be shown in 32 minutes, should be addressed to the Graphic Services Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13.

Book Review

1943 *Supplement to A.S.T.M. Standards, Part I, Metals*, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia. Price $3.00

This volume which is the first supplement to the 1942 *Book of Standards* issued previously by the society contains some 61 new and revised standards and tentative standards. Of these, 26 relate to standards which are divided into 14 newly adopted, and 12 replacements of existing standards. Similarly 20 of the 35 tentative standards are replacements, and 15 are published for the first time. Accompanying the supplement are yellow gummed stickers for attachment to indicated pages in the *Book of Standards* to call attention to obsolete items. In addition one section of the supplement is devoted to emergency standards issued during 1943 which are printed on pink paper so that they may be located quickly. Separate pink slips are included for changes in emergency standards issued previously.

Solicits Suggestions

A questionnaire seeking data on movement and storage of materials has been issued as part of a postwar planning program by Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich. Sent to executives in every industry in which material handling is a problem, the questionnaire is expected to provide data which will be used for designing and building industrial trucks and tractors engineered to fit postwar needs.

PRACTICAL DATA FOR PRESENT PROBLEMS

Here are two books designed to help users of Molybdenum steels and irons to conserve all alloying elements, and possibly steel and iron, by getting the most in the way of strength, toughness and wear resistance with the lowest alloy content.

"MOLYBDENUM IN STEEL" covers the fundamental metallurgy of Molybdenum steels. Heat treatment – physical properties – applications – of a number of these steels are treated at length.

"MOLYBDENUM IN CAST IRON" covers the effect of Molybdenum in gray iron, giving suggested analyses for practical applications and detailed discussion of high strength (60,000 p.s.i. and up) irons.

Both books will gladly be sent free on request.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

MOLY

500 Fifth Avenue · New York City

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

I SEE by the calendar," Bill said the other night, "that the annual A.F.A. convention, to be staged this year in the city of Buffalo, has sneaked up on us again. Positively uncanny the way time flies. Once upon a time these events were a whole 12 months apart. Recently it appears to me one of them is hardly out of the way before we are into another one. Have you any reasonable explanation to offer for this peculiar phenomenon?"

"I see nothing either peculiar or phenomenal," I said, "in this wonderful discovery which apparently you have just made. During the first half of a man's life he is engaged in a bitter uphill fight to keep ahead of the sheriff and the old clothes man. Naturally the days, the weeks, the months and the years seem long. In the second half of his life all tied up in a knot with high blood pressure, hardened arteries and shortened breath, he is coasting down hill in a semi-conscious condition and naturally the years and the mile posts flit by rapidly."

"Where do you get that tied up in a knot stuff? Your explanation is in the same category as that of many men who pose as experts and know no more about the subject under discussion than Micky Mackie's little red hen knows about the tidal bore in the Bay of Fundy. One of these birds will appear on a public platform and at the end of his lecture will invite questions from the audience. An innocent lad pops up and asks a civil question. The lecturer smothers him in a flood of words—another tidal bore—and then remarks blandly, 'I trust that answers your question satisfactorily. Are there any others?'

"Nearly every question has two or more sides to it, but the average man insists on seeing only one side. A comparatively small number of courageous individuals insist on looking at all sides. Consider for example the inspection of castings by men appointed by the customer. The foundryman claims that the inspector is incompetent and rejects perfectly good castings for reasons that would not have any weight with an ordinarily intelligent child over the age of seven. The inspector claims he has no choice. His principals have laid down certain specifications. If the castings do not measure up to these specifications even to the most minute detail, out they go. Recently I had a long letter on this subject from an old friend and I will thank you kindly to refrain from any hasty comment until I finish reading it. Now then as they say down home, give a good listen."

Dear Bill: For some time past I have been bothered by a set of conditions, and now I am going to drop the bottom and let it land square in your lap. I know you are familiar with many of the outlandish procedures of present day foundrymen, but I really doubt if you know to what extent some foundrymen carry them. In other words—and probably other words are needed—you don't know the half of it.

For the past 5 years I have been teaching foundry practice. Stressing skills and the related subjects has been a hobby and at the same time a religion. I cannot conceive of a foundry course without foundry chemistry, study of levers, statics, strength of materials and elementary metallurgy. I always have believed that the foundry offered more opportunities than any other field because of the magnitude of the industry, the usual type of recruits and lack of competition.

Being close to several large war plants, our school has suffered a serious loss in enrollment, as the students left to go to work for high wages. As a result I am taking a year's leave of absence which probably will be extended to the end of the war. So—I became an inspector for the navy. Not a high salaried job, but there is not much grief connected with it, and I have an opportunity to profit by the mistakes of others. Believe me, Bill me boy, I am learning plenty.

I have seven foundries on my list; brass, aluminum and gray iron. One aluminum foundry makes permanent mold castings, and one is making castings centrifugally. So far I have not found a nonferrous foundry where mixtures are figured in advance. A certified analysis comes with the ingot metal and the rule seems to be that so long as you use some ingot you may use anything else with it just to fill up the pot.

Last week one foundry ran out of ingot so they used nothing but gates. The alloy was Alcoa 356, or Federal QQA 596 class 8. I questioned the advisability of this procedure but didn't get a rise. After all, I was only the navy inspector, and what did I know about a foundry. The next 4 days it was the same thing over again. Tomorrow I have to break the sad news that 3 days' work must be scrapped because the chemical report from a government laboratory shows the magnesium content less than 0.09 per cent when the minimum requirement is 0.20 per cent.

"Wad some power the Gifties gie us"

Two months ago the A.F.A. Chapter had a representative of an ingot maker discuss the nonferrous problems and test bar difficulties of local foundries. Foundries having the most difficulties did not have a representative at the meeting, although they were notified by mail a week before the meeting date. It was a very good meeting and the expert did an elegant job. At the following meeting the senior assistant in the Inspector of Naval Materials Office was one of the two main speakers and he really gave the foundries hell. And don't think for a minute they did not have it coming to them.

Test bars! What a lot can be said about them! The Navy recommends a certain method for making test bars for red brass. The gate enters the mold just above the bar so that the hot spot comes in the riser. A number of shops started with this bar, but gave it up as they were not able to get good bars. They did not follow the drawing exactly. They gated directly into the bar. Then some one sat up late one night and blossomed out with a remarkable pattern. The mold set flat when poured and three bars were cast from one gate or runner. The test bar itself weighs 1 pound 7 ounces and the riser weighs 12 pounds. It requires approximately 50 pounds of metal to pour this test bar mold.

Most of the fractures show a shrinkage adjacent to the riser. One foundry using this bar was urged to experiment with the first or regular type bar. You know Navy inspectors can only suggest. We suggested it be made in a dry sand core to eliminate the hazard connected with hard and soft ramming, wet sand, and loss of molding time incident to changing jobs. The result was so good that this foundryman now uses that bar exclusively. Previously his failures ran about 10 per cent. The last I heard he had run over 100 heats without a failure. In another foundry in the same vicinity, the superintendent who is the Old Man's son knew all about this test bar made in a core and the results obtained. He would not use it. In the past 3 weeks he has had 19 heats of red brass rejected. Some of the rejections were due to chemical failures. But he still hangs on to the old test bar method.

Many test bars break outside the gage marks. Examination of the fracture in-

(*Concluded on page* 159)

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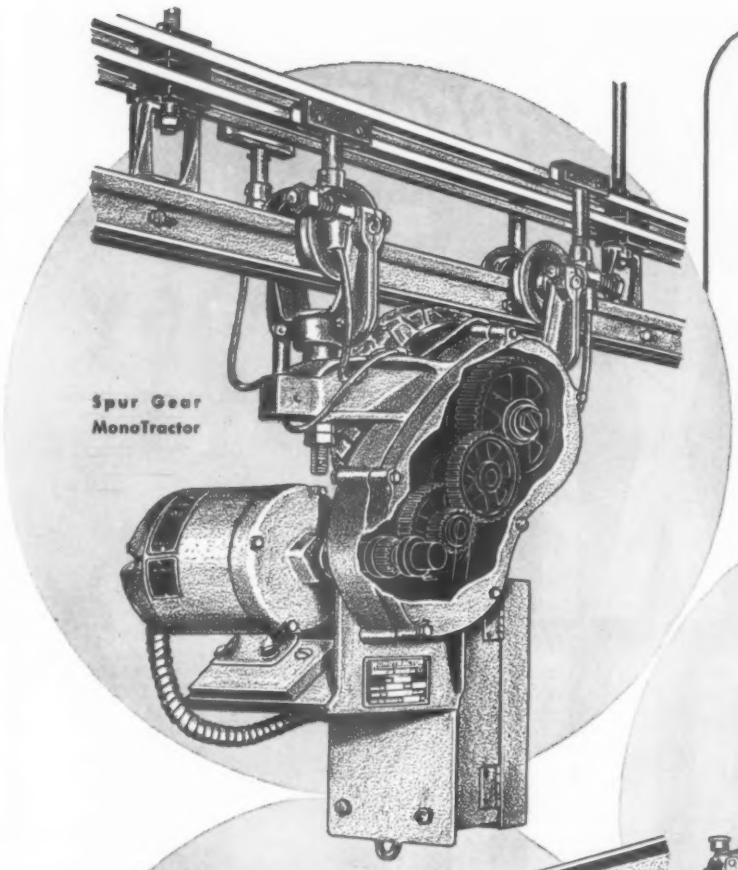
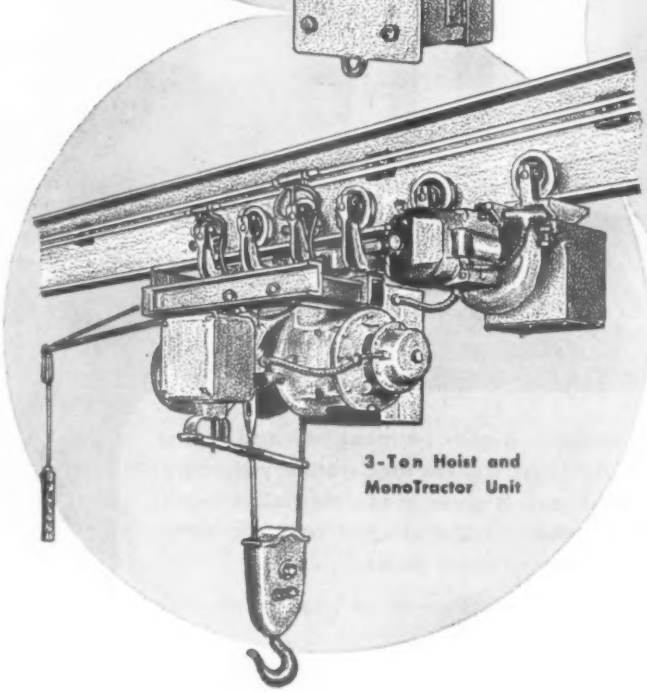
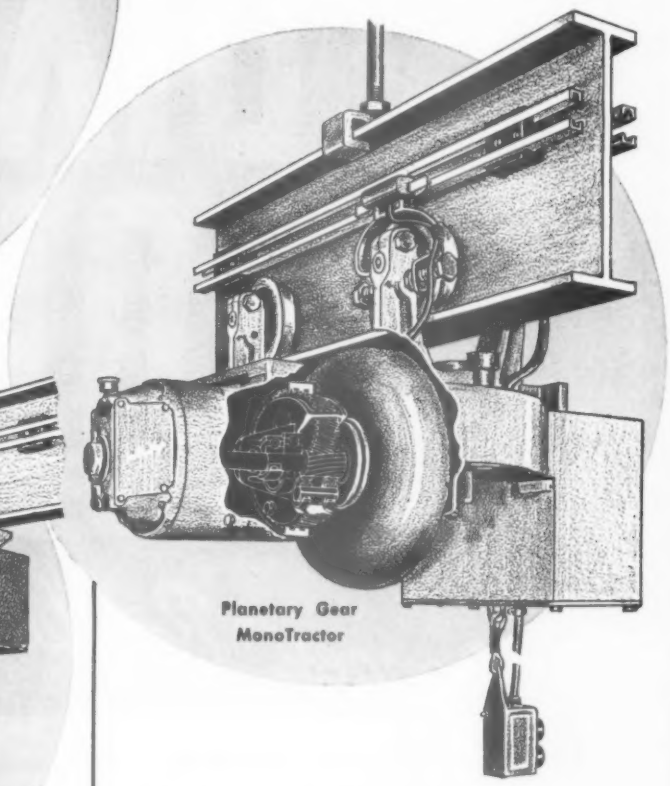


Spur Gear
MonoTractor



3-Ton Hoist and
MonoTractor Unit



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VERY easy SHAKE OUT

2 BIG ADVANTAGES OF

DIXIE BOND

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The Strongest Bonding Clay in America

Dixie Bond assures you of higher green strength, higher permeability and higher flowability than any other bonding clay in America. It gives moderate dry strength, resulting in lump-free sand and faster shake-out. It gives moderate hot strength, very low contraction and a high sintering point. *Results:* cleaner castings, better finish, lower flask expense, fewer cracked castings, more profit.

These important advantages are all yours, Mr. Foundryman, if you standardize on Dixie Bond.

However, no one bond clay can do all foundry jobs equally well. Four other ECP products round out a complete line (see list at bottom). With five products, therefore, and their many combinations, the ECP engineering staff undertakes to fill requirements *exactly*, and to deliver you *most bonding strength per dollar.*

Five Bulletins — which shall we send you?

EASTERN CLAY PRODUCTS, INC., EIFORT, OHIO

DIXIE BOND · BLACK HILLS BENTONITE · REVIVO BOND · REVIVO SUPER BOND · BALANCED REVIVO

ECP *All* TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

(*Concluded from page* 156)

variably shows a shrinkage. A more careful study of the setup shows that the neck connecting the riser to the casting freezes before the large end of the bar. The reduced center section of the bar draws from the heavy end and produces a spongy section. We have brought this to the attention of foremen and superintendents at different times. Nothing has ever been done about it and they still lose out on elongation failures. The usual attitude is: You attend to your inspecting. We are making these things.

Some of the brass foundries are beginning to use pyrometers ostensibly to determine the pouring temperature, but some are *just* using them. One shop has a rather unique system. The thermocouple is inserted into the metal in the crucible and when the needle reaches the desired temperature, the tip is yanked out of the pot and the metal is poured into the test bar. You may imagine this system shows some remarkable and irregular results. The superintendent's attention was directed to an article in the A.F.A. *Transactions* dealing with pouring temperatures of nonferrous metals. The next thing I knew he was trying to pour 85-5-5-5 test bars at a temperature of 1850 degrees Fahr. and getting 1 bar and 2 missruns per mold, and six failures out of 10 tensile tests. About 2 weeks ago I saw the same metal poured at a temperature of 2400 degrees Fahr. The inspector in this plant tells me that now they are pouring the test bars at a temperature of 2380 degrees Fahr. and getting results as good as might be expected, if you are not expecting much.

It is not my purpose to condemn all foundries and the men who operate them. I am a mechanic and I appreciate and salute a good mechanic any time and any place. Many good shops are doing a wonderful job and they deserve the greatest credit. These 2 for a nickel chiseling holes in the wall bring disrepute upon all. What do you make of it, Bill?

There is one more high binder I want to take a crack at and then I will close.

We hear a lot about conservation of tin, copper, nickel and other metals and materials. We also hear a lot about these big shot engineers, and we also hear about saboteurs. Now I contend we have some of the best and highest paid saboteurs in the world working in our aircraft factories, but we blandly call them engineers. Just a minute. Let me explain.

An engineer designs a piece. At some time or other he came into contact with a piece of manganese bronze, so he decides to put a Federal specification on it. He labels it QQB 726b Grade A which calls for yield point 25,000 pounds per square inch, tensile strength 65,000 pounds per square inch, elongation 20 per cent in 2 inches. Suppose for example this casting is an AN fitting that has a rubber hose clamped on to it at each end. Obviously the weakest part of the assembly is the rubber hose, and most assuredly the hose will not stand any 65,000 pounds pressure per square inch. Nevertheless, working under strict orders the inspector has to reject manganese bronze castings because the test bar pulls only 64,000 pounds per square inch, and the yield point and elongation tests are perfectly satisfactory. Isn't that a laugh? Or is it?

Recently I had to reject a heat of 85-5-5-5 counter weights because the zinc content was only 3 per cent where the specification called for 4 per cent. The only machine work on these castings was for two bolt holes to fasten them in place. Hitler himself couldn't do a better sabotage job. Can you imagine any person with even the rudimentary intelligence of a moron specifying a tin content of not less than 4.00 per cent in a-a-No. I won't say it. Just a lump of a counter weight.

Another job that is real hot just now is made of aluminum alloy No. 43 and must meet exacting chemical and physical specifications and show a tensile strength of not less than 21,000 pounds per square inch and an elongation of 5 per cent. This casting is completely enclosed in vulcanized rubber, where it is not even needed for reinforcement.

Many specifications are put on drawings for no definite reason, but simply because the engineer thinks it is the proper thing to do. The practical thing of course would be to just put down the actual requirements. Many castings could be made from almost any aluminum alloy and still serve the purpose. However, when a definite specification is placed on the job, the inspector has no choice but to follow his orders. Many thousands of dollars have been wasted, thousands of man hours lost, production delayed and I'll venture to say many lives have been lost because some people unconsciously are sabotaging the war effort by putting unnecessary and restricting specifications on many jobs.

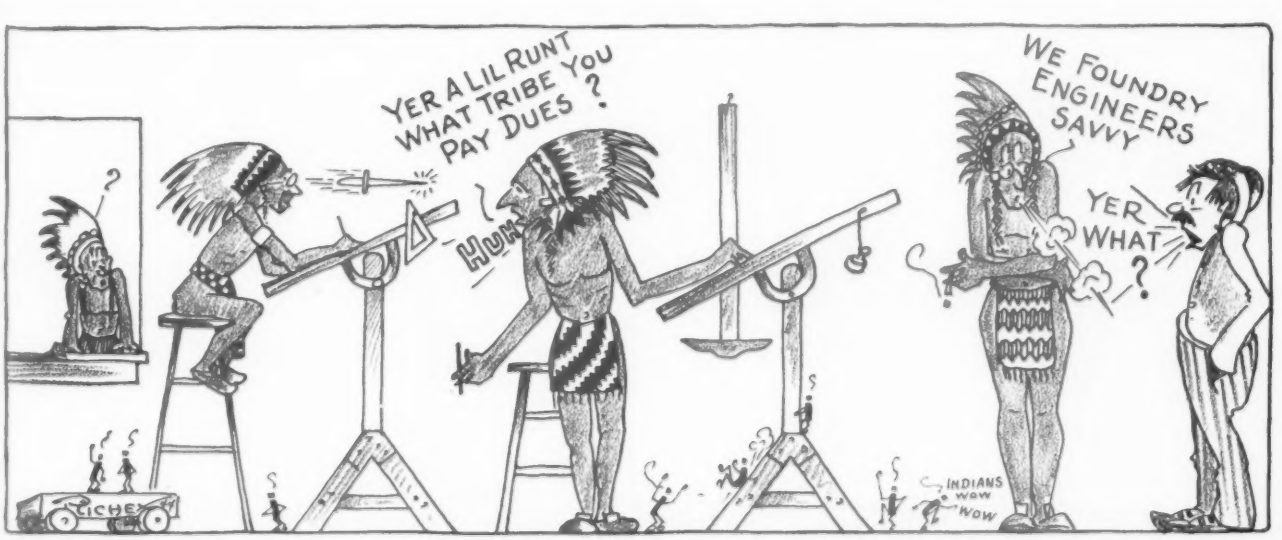
The navy inspector comes in for a lot of abuse, but the navy is only seeing to it that the requirements are met. If a contractor does not know what he wants, how does he expect the navy inspection department to know? The longer I live the more convinced I am that I know what they did with the wooden Indians they had in front of cigar stores when I was a kid. They are—well you guess. I trust I have not taxed your patience too much with this lengthy epistle, but I think you will get a kick out of it. In fact you might have some fun in Buffalo by throwing this inspection ball into the arena and letting the boys kick it around a little.

Acquire Instrument Manufacturer

Assets of Wheelco Instruments Co., 847 West Harrison Street, Chicago, have been purchased by Fred A. Hansen and Cary H. Stevenson, vice presidents of the Lindberg Engineering Co., Chicago, and several associates. Mr. Hansen and Mr. Stevenson will continue active in management of Lindberg. Business of the instrument company will be continued at the same location under a new corporation, the Wheelco Instruments Co. Officers are: President, Mr. Hansen; secretary and treasurer, Mr. Stevenson; and vice presidents, Richard Schoenfeld and Theodore Cohen.

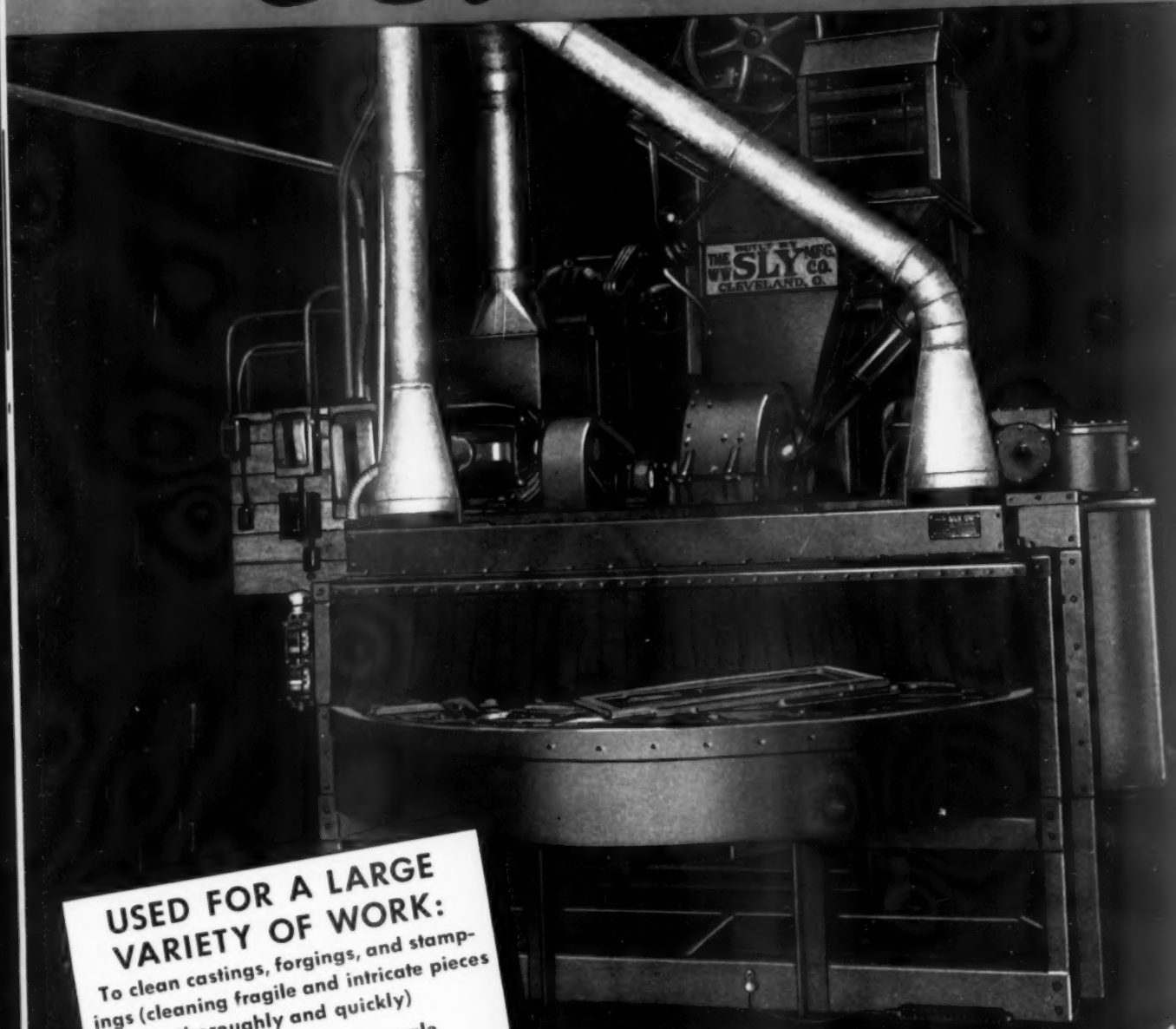
Two Plants Honored

Two plants of the Babcock & Wilcox Co. recently were presented Army-Navy "E" awards. The Augusta, Ga., works of the Refractories Division received a new pennant with two stars and the Barberton, O., plant a three-star flag.



Prominent foundryman reports remarkable example of conversion program where former cigar store Indians have become war workers

Airless Blast-Cleaning BY SLY "CENTRI-BLAST"



4396-A

USED FOR A LARGE VARIETY OF WORK:

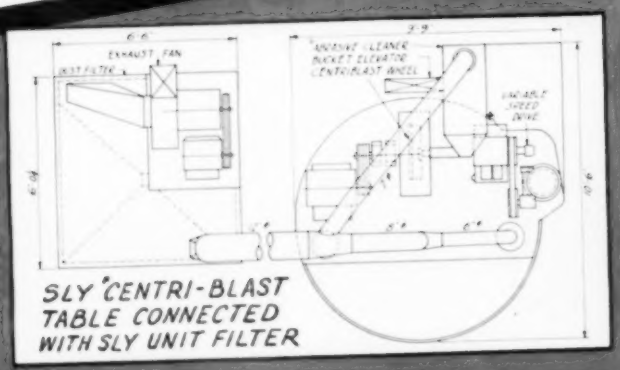
To clean castings, forgings, and stampings (cleaning fragile and intricate pieces thoroughly and quickly)

Removal of heat treat scale

Preparation of surfaces for better bond of finish coatings

Surface peening for stress relief

A Sly "Centri-Blast" Table cleaning stove plate castings. Note sturdy underframe construct



SLY CENTRI-BLAST TABLE CONNECTED WITH SLY UNIT FILTER

SLY "CENTRI-BLAST" ROTARY TABLE

Puts blast-cleaning on a standardized basis. Instead of uncertainties, you can count on regular, uniform, quick cleaning. It helps out on the manpower situation, too. All costs come down—production goes up—quality of cleaning improves.

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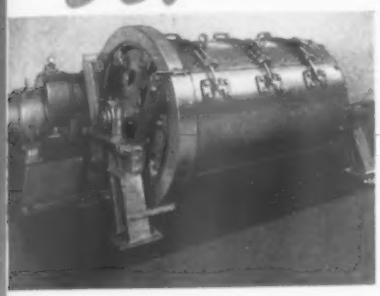
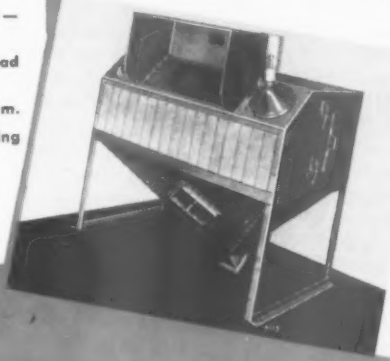
For Cleaning *Faster, Better* and at *Lower Cost*
Choose from the SLY Complete Line of Foundry Cleaning Equipment

SLY TUMBLING MILLS



1. Heavy forged steel trunnions, extra heavy roller bearings.
2. Special door locks — easily operated.
3. Extra heavy gearhead motor.
4. Integral motor platform.
5. Loading and unloading from either side.

SLY BLAST CABINETS



1. Two lights mounted at front to illuminate castings.
2. Operator's eyes shielded by protective hood.
3. Easy loading and unloading of castings.
4. Used for thorough cleaning of small and intricate parts, or as an auxiliary to larger units.

SLY BLAST ROOMS

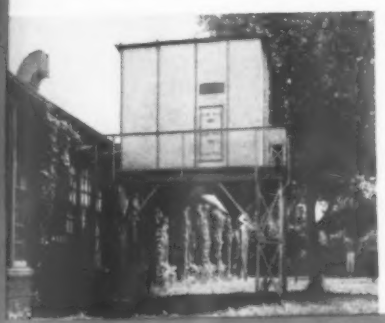
1. Overall down-draft ventilation.
2. Ample illumination.
3. Lined throughout with 3-16" wear plates.
4. Floor of grating and perforated plates.

SLY AIRLESS BLAST CLEANING EQUIPMENT

MILLS AND TABLES

Exclusive wheel features for fast and economical cleaning.

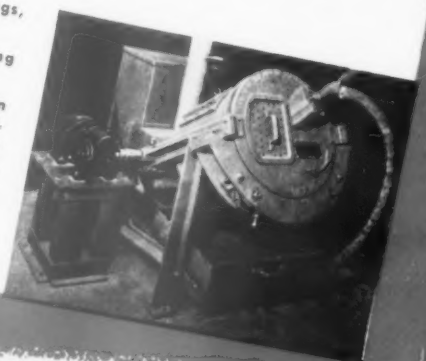
SLY DUST FILTERS



1. More filter cloth—hence greater filtering capacity.
2. Filter bags under tension (patented) insure: (a) minimum resistance to air flow, and (b) complete dust removal.
3. Simpler shaker mechanism—less moving parts, less maintenance.
4. Bags more easily replaced.
5. Automatic control — any degree.

SLY BLAST MILLS

1. Handles quantities of castings, forgings, stampings, hardened steel parts.
2. Tilted barrel with rolling action.
3. Convex perforated bottom plate forms bottom of barrel.
4. Work is constantly turned bringing bottom pieces to top.
5. Stationary head of barrel has large door for loading.



70 YEARS OF SERVICE TO THE FOUNDRY INDUSTRY

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STEEL FOUNDRY TOPICS

Discussed at Conference

FOUR sessions of the seventh annual foundry conference held by the Wisconsin Chapter of the A.F.A. at Milwaukee, Feb. 10-11, were devoted to discussion of subjects of interest to steel foundrymen. These included: Consumer viewpoint on steel castings; hydrogen in steel castings; sand problems and grain size control; and effects of atmospheric pressure on risers.

In the first session a paper presented by L. A. Danse, General Motors Corp., under the chairmanship of David Zuege, Sivyer Steel Casting Co., Milwaukee, the speaker sharply criticized the quality of steel castings. He advocated research as the best and only solution for the steel casting industry if there is to be any consideration from the automobile industry. He said the forging and fabricating industries had done a good job in this respect and also complimented the malleable foundrymen. While he believes that it is possible to make sound and satisfactory castings for the automobile industry, he claimed that the majority of steel foundries fail to do so. He advised the foundries to pay less attention to securing a good yield and to make use of every possible testing facility to improve quality. He advocated the employment of more technically trained men.

The paper provoked unusually warm discussion. A number of steel foundrymen objected decidedly to some of the statements. H. F. Taylor, Naval Research Laboratory, in an exceptionally able manner defended present day steel castings. There was general agreement that the meeting was interesting and the discussion was helpful and instructive. Foundry executives who discussed the paper showed a very constructive and co-operative attitude and expressed the opinion that constructive criticism is welcome at all times.

In the second session presided over by Paul Power, Maynard Electric Steel Casting Co., Milwaukee, Dr. George Moore, Battelle Memorial Institute, Columbus, O., using a number of slides, delved deeply into the subject of hydrogen in steel castings. He stated that even as small an amount as 0.001 per cent hydrogen under a pressure of one atmosphere represented a volume equal to the volume of the steel. There is no fixed solubility limit for hydrogen in steel. The amount is dependent entirely on pressure. He showed curves illustrating the solubility limits in manganese, nickel and chromium as compared with that for iron; also the corresponding figures for some of the iron-chromium-nickel alloy steels. He pointed out that it is the precipitated hydrogen and not the hydrogen in solution, that is the cause of trouble. He also claimed that there is no such compound as iron-hydride. Presentation of the paper was followed by a lively discussion.

At a meeting on Friday morning presided over by James J. Ewens, Grede Foundries Inc., George W. Anselman, Goebig Mineral Supply Co., presenting a paper on method of grain size control for the steel foundry, stated that in selecting a sand to make steel castings the most important fact to take into consideration is the cross section or thickness of metal, not the total weight of the casting. A casting weighing 500 pounds may have cross sections varying from 2 to 6 inches. A similar weight casting may have no heavier section than 1-inch. Taking into consideration the physical properties of the sand a more open sand will be required to produce the thick section casting. The speaker claimed that the ordinary screen test is not a sufficient guide in the selection of a suitable sand for steel foundry use.

The many variations in the types of bonding materials in facing sand for carbon or alloy steel castings do not in any way affect grain size control. Permeability must be maintained uniformly from day to day. Grain size helps a great deal in controlling the finish of the castings. However, the clay, cereal, pitch or other added ingredients have a great deal to do with the finish and must be watched as closely as the grain size.

A more uniform grain distribution gives a denser packed sand and fewer voids with less ramming. A hard, uniformly rammed mold has a higher permeability with less chance of penetration and a better finish. The policy of loading a large grain, high permeability sand with silica flour is bad, not only from a cost standpoint, but from the finish standpoint. High silica flour produces extremely high hot strength and causes cracked castings. Starting with the silica sand and checking the sintering points of the grain sizes from 30, 40, 50, 70 and 100 mesh and silica flour made from the sand the sintering points are progressively lower from the coarse grain down to the flour. The speaker also discussed new and old sand combinations and pointed out that satisfactory results in the laboratory do not always work out as well in the foundry.

Use Atmospheric Presure

With Carl Haertel, Falk Corp., in the chair at the final session on steel castings, H. F. Taylor, Naval Research Laboratory, Washington, discussed effects of atmospheric pressure on risers and the manner in which this natural force now is utilized in many steel foundries to minimize shrinkage in the castings. He stated that where the system has been installed the casting yield has been increased from 5 per cent upward. Through a series of blackboard sketches he illustrated the theory and the method of application to secure proper results. He also pointed out that unless proper advantage is taken of this natural force the results will be negative instead of positive.

In a simple and nontechnical manner it may be said that the entire system is based on a natural law, or rather two natural laws: First the law of gravity, and second, nature abhors a vacuum. The first law causes liquid metal to sink downward from the risers into the casting to compensate for shrinkage. The second law causes liquids in adjoining receptacles to come to the same level.

If the riser on a steel casting re-

(*Continued on page* 164)

Active in arrangements for the Wisconsin regional foundry conference were, left to right: Roy M. Jacobs, Standard Brass Works; Harry E. Ladwig, Allis - Chalmers Mfg. Co., conference chairman; John Bing, A. P. Green Firebrick Co; William A. Hambley, Allis-Chalmers Mfg. Co., conference co-chairman

"Blue" Is the Signal for "Go"

The *blue flash* trademark now being applied to Bay State Portable Snagging Wheels means go ahead, full speed.

Bay State Portable Snagging Wheels cut fast and cool, and the exclusive (patent pending) method of imbedding the nut is an important safety feature. Furthermore, the 3/16" diameter wire ring moulded into the wheel and the finer abrasive around the nut aid in supporting the nut, and give added strength to the thinnest part of the wheel.

These special features of Bay State Portable Snagging Wheels will give you an idea of *extras* from Bay State... the finest honing and superfinishing stones ever manufactured ... grinding wheels in fractional grades ... mounted points and wheels that are ground, not pressed, to shape.

Bay State engineers will help you determine the best type, size and grade for almost any grinding or finishing job you may have.

Write for Bulletin C on Portable Snagging Wheels.

BAY STATE ABRASIVE PRODUCTS CO.
WESTBORO, MASS.

BLUE FLASH GRINDING WHEELS *FAST and COOL*

HONING AND SUPERFINISHING STONES · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS
PORTABLE SNAGGING WHEELS · MOUNTED WHEELS AND POINTS · GRINDING WHEELS

(*Continued from page* 162)

mained liquid the metal would continue to flow downward until the casting solidified. Unfortunately, the top of the riser freezes over first and thus prevents the atmospheric pressure from functioning from that direction. Every foundryman has noted the manner in which the side walls of a riser occasionally are dished. This is caused by atmospheric pressure exerted.

In the preventive method described by Mr. Taylor, and presented in considerable detail in the October, 1942 issue of THE FOUNDRY, a blind riser is set up close to the casting. A piece of dry sand core, or other material enters the riser and provides entrance for air after the top and walls of the riser have solidified. Pressure of this air forces the metal from the riser to flow into the casting.

Proper relationship between pattern shop and foundry was the subject of a paper presented at a Thursday afternoon session on patterns by G. F. Smitka, Ampco Metal, Inc. Friction between department heads may be reduced by the practice of common sense. Neither should expect too much of the other. The molder may not understand construction details of a pattern, but he can instruct the patternmaker on the best method of molding, location of joints and parting lines, size, shape and position of gates and risers and amount of draft.

Work in Harmony

In no two branches of any industry is the need so urgent for mutual understanding and good feeling. Occasionally a difference of opinion arises in regard to the best method of molding a casting. The molder should study the best and cheapest method, but should not lose sight of pattern shop cost. If necessary each one should be willing to sacrifice part of his opinion to the other. The ultimate object of both is the same, to get out good work at the least cost. Patternmakers have a legitimate grievance when they see patterns abused in the foundry by careless molders.

The ensuing lively discussion revealed among other things that the root of many disputes lies further back than either the pattern shop or foundry. In some cases the customer insists on an abnormal number of patterns on a plate. No room is left for proper gates or risers. In other cases, the designing engineer or draftsman is responsible for defective castings. One member claimed that his firm would not accept orders for castings in which the drawings did not conform to proper design, especially in regard to adjoining section thicknesses. Another lively discussion was based on suitable pattern coatings. Several members preferred a proprietary material to the old standard shellac. On the subject of gates the author of the paper stated that in certain cases, the trial and error method is necessary. He instanced one case in which 24 castings were made and fractured before a satisfactory gating method was established.

An interesting and intimately detailed paper on the comparatively little known method of making pressure cast matchplates in plaster molds was presented by H. Swanson, Arrow Pattern Co., Chicago, under the chairmanship of L. B. Pfost. A well finished metal master pattern should be used where close tolerances are essential. Where a wood master pattern is used it should be sanded carefully and given at least three coats of shellac to prevent the wet plaster from soaking into the wood. An average plate of eight sections will have the pattern in the plaster for 5 or 6 hours. One of the advantages of the method is that only one master pattern is required. Obviously all pattern units on the plate will be alike.

Briefly, the required number of sections are made from the master pattern. In each instance the pattern is blown out of the plaster mold by compressed air. It is not rapped or vibrated. The drag sections are placed on a machined iron plate and surrounded by a metal flask and all the remaining space is filled with plaster to form a solid mass. After the plaster has set the drag is reversed and the cope set in place with machined pins and guides. The upper sections of the plaster molds then are adjusted by the dowels and pins previously cast in. The cope then is filled with plaster and the mold is placed in an oven for about 15 hours at a temperature of 450 degrees Fahr.

Reports on other technical sessions of the Wisconsin foundry conference were presented in the March issue of THE FOUNDRY.

The dried mold is placed on a cast iron plate with grooves on the face to serve as vents. The required plate size and thickness are laid out with metal stripping and sheet asbestos. The cope is set on and the assembly bolted together. The pouring head or pot is set over a sprue opening in the top plate with a 1/32-inch thick asbestos sheet between. This sheet will hold all the aluminum in the pot until it becomes approximately as thick as mortar. A head with an air hose is bolted on and air is admitted at a pressure of 8 pounds per square inch. This breaks the asbestos seal and forces the metal into the mold. Air pressure then is reduced to 4 or 5 pounds and left on for 30 minutes. The material in the mold is a fine grade of molding plaster mixed with a fine long fiber mineral in the proportion of 1 part mineral to 2 parts plaster. The materials are mixed in a tumbling barrel with 5 parts water to 4 parts of the composition.

Discussing elimination of casting defects through pattern equipment changes on Friday morning, A. F. Pfeiffer, Allis-Chalmers Mfg. Co., presented an interesting series of slides illustrating typical jobs on which extensive changes were made. In some cases the changes were made to overcome certain casting defects in the resulting castings, while in other instances the changes were made to facilitate greater production. In one extreme instance where pattern requiring 33 coreboxes yielded only four castings per day, a radical change in certain features of design, reduced the number of coreboxes to 8 and a production of 140 castings per day.

The speaker pointed out that although the utmost care and study is given to an original pattern, unforeseen factors turn up later when the pattern is placed on the production line in the foundry. He condemned the tenacious habit of some firms of keeping an unsatisfactory pattern in use for no better reason than that changes would involve spending money. Patternmakers and their employers should maintain an open and inquiring mind and never hesitate to scrap existing equipment when something better is discovered or brought to their attention. He strongly advocated free and open discussions between the engineering department, the pattern shop and the foundry. He also referred to the value of scale models for conveying information to all concerned before the actual pattern and coreboxes are constructed. Invariably the cost of the model is absorbed in the cost as an almost negligible factor.

Plan for Apprentices

Postwar opportunities for apprentices was the subject of a paper presented by Chairman Carl A. Rothe, Wisconsin Industrial Commission, and discussed by Joseph Gratz, G. & O. Pattern Works, and C. W. Morisette, Milwaukee Vocational School at the final pattern session Friday afternoon. Mr. Rothe claimed that after the war employers will be flooded with orders, but will be unable to handle them through inability to hire a sufficient number of skilled mechanics, and this condition will be due to the fact that young men are not learning the skilled trades. He listed the following reasons for this condition: Insufficient number taken on before or during the war period. Lowering the draft age from 20 to 18. Draft boards give no assurance that apprentices will be allowed to finish their training. The type of applicant today is not up to pre-war standards. High wages in war plants prevent boys from becoming apprentices. Release of boys in the service necessarily will be orderly and slow. Many boys are not coming back. Others will take up other occupations. Even under normal conditions in recent years the number of apprentices has not kept pace with the natural loss of skilled men.

Several members found fault with a prevailing condition where employers give an incoming apprentice no credit for work he may have done in school. Touching on the same subject from another angle a member claimed that in plants where apprentices spent

(*Concluded on page* 182)

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WASHINGTON Notes

RECENT allocation of controlled materials—aluminum, copper, and steel—to the Army, Navy and other government claimant agencies for the second quarter revealed some scaling down from amounts requested, but quantities allotted are regarded as sufficient for all military production and construction now planned for April, May and June. Steel earmarked for civilian requirements totals 210,000 tons, against 155,000 for the first quarter—hardly enough to indicate any significant resumption of civilian goods production.

★ ★ ★

This action with respect to material allocation for civilian programs definitely postpones consideration of any further switch to civilian production until the latter half of the year. Meanwhile some attempts are being made to relieve the more acute spots on the home front, such as the authorization to make 2,000,000 *electric flat irons for civilians* (5,000,000 *were made in* 1941) *and plans to build* 22,000 *electric stoves quarterly. The latter total includes* 17,000 *ranges for civilians and the Federal Housing Administration, and* 5000 *for military, export and Federal Public Housing Authority requirements.*

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THE MANPOWER situation is being considered in all instances where curbs on civilian goods output are lifted. In the case of the electric irons the sole plates—whether cast, stamped, or forged—may be made in Group I labor areas (local areas in which labor is particularly scarce) only by manufacturers who are authorized to make electric irons under the program or who have been granted specific permission to make these parts by the nearest WPB field office.

★ ★ ★

Lifting of weight restrictions on civilian stoves is in prospect, but limitations on unit production would remain in effect. This would end the "victory" models and permit use of stove castings of the prewar weight, compared with the 30 *per cent reduction recently in effect. Production of* 821,000 *ice refrigerators is scheduled for* 1944 *but start of production of the mechanical type is not in sight. For one thing, the small motor supply still is too tight, production for aircraft use recently having been inadequate.*

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TRANSPORTATION — railroad and automotive—is one of the chief beneficiaries of the easier supply of metals. Carbon steel allotted domestic transportation for the second quarter totals 1,812,000 tons, compared with 1,538,645 tons in the first quarter. ODT requested materials to build 25,000 freight cars but was cut to 18,500, because WPB claims that it is the limit of car building capacity. For automotive replacement parts, the carbon steel allotment was increased from 93,000 tons in the first quarter to 137,000 tons the ensuing 3 months.

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Practically all power cranes and shovels produced this year will be needed by the armed services, and the civilian needs will have to be filled largely from used equipment. About 25,000 *cranes and shovels are in the used equipment inventory, but relatively few of these are for sale.*

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STEEL foundries now may mark up the price of those castings subject to radiographic or magnaflux inspection, OPA has ruled. For radiographic inspection, the increase may be 12.5 to 30 per cent of the base price of the casting, according to examination specifications. For magnaflux inspection, the addition may be from 15 to 30 per cent of the base, according to amperage required. If the producer of the casting performs the inspection himself, he may also add other charges based on the capacity of his x-ray machine or amount of radium used.

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Recent OPA changes in the price regulation affecting gray iron castings permit sellers using the "base period" method of computing prices to add overtime labor costs. On orders of 200 *pounds or less, maximum prices now are figured by multiplying the shipping weight by twice the seller's average price for gray iron castings in* 1942 *and adding to this a starting charge of* $8 *for non-cored or* $12 *for cored castings. Castings sold under the "formula" method hereafter may be recomputed only once. This is intended to stabilize ceiling prices and remove uncertainties for both buyers and sellers.*

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AMONG other revisions in the gray iron ceiling structure, a seller who delivered a casting during the base pricing period Aug. 1, 1941 to Feb. 1, 1942 now must use the "base period" method of establishing his ceiling for that casting, regardless of whether the contract for delivering the casting was made before or after Aug. 1, 1941. Sellers who choose the "pre-base" pricing method after March 31 may not shift over to the "formula" method. In order that a casting may be priced by the "base period" method, the identical casting must have been sold or offered for sale in the base period. If substantially the same casting was sold or offered in the base period, a maximum price is thereby established only if it was sold or offered to the buyer to which the casting currently is being priced.

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Gray iron foundries have been reminded by OPA that they were required to file on or before Jan. 15, 1943, *three copies of a form detailing information on wage rates, overhead rates, cost of materials, profit margins and pricing methods in effect Feb.* 1, 1942. *This Form* 344:2 *is obtainable at any OPA regional office and is to be filed there. Records on price compilations also are required to be kept available for inspection.*

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THE HEADACHES that reconversion to peacetime production will cause make evident the wisdom of planning now for the policy to be followed later, regardless of the indefiniteness of the date when the changeover can be started on an appreciable scale. Here are some of the questions that must be answered: To what extent should government controls continue beyond the end of the war? If partial resumption of peacetime production is possible, which companies of an industry should be allowed to reconvert and to what extent? Should the entry of new manufacturers into a particular industry be regulated, and, if so, how? Many other considerations enter the picture, all of them capable of producing more debate than did the drastic slashing of civilian goods output.

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It appears that the various industry advisory committees set up by WPB will play an important part in the difficult period of transition from a wartime econ-

(*Concluded on page* 169)

NONFERROUS CASTINGS: **No increases in maximum prices of nonferrous castings are permitted within one of the groups specified in revised MPR 125 where changes in alloy are instituted because a particular alloy is unavailable or will not be supplied by the smelter, according to an OPA ruling. If a foundry changes from one alloy to another and finds it necessary to pay a higher price, no increase is permitted on that basis alone unless the change is imposed either by the buyer or by order of a government agency. Should either of the latter two impose a change in alloy between types within one of the listed groups, the difference in price of the metal, plus 30 per cent of the difference, is to be deducted from or added to (as the case may be) the base price of the casting.**

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(*Concluded from page* 166)

omy to a peacetime basis, just as the influence of WPB is unlikely to end the instant production for active warfare no longer is necessary.

★ ★ ★

THE SUBJECT of scrap supply has been out of the headlines lately, although the belief that a surplus exists is erroneous, and the fact that some of the former sources have shrunk causes concern in certain quarters. Farm scrap in many districts has been fairly well cleaned up, and the same is true of idle and obsolete equipment in various industries. England has returned to the market for a portion of the overseas scrap that heretofore flowed to the United States. Automobile graveyards, which produced over 2,000,000 tons of scrap in 1942, provided only half that amount in 1943.

★ ★ ★

Steel mills are being encouraged to maintain the proportion of hot metal used and to dispose of their cast scrap for use by foundries which have been consuming more pig iron because they have been unable to obtain cast scrap. Should more pig iron become necessary for production of steel and castings, some blast furnaces that now are down can be brought back into blast.

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A NEW minimum preference rating of AA-5 or better, designed to curtail distribution, has been established for 22 classes of industrial equipment under an amendment to Order L-123. Previous requirements were A-1-c or better. The list includes air filters, arc welding machines, and high pressure blowers and fans and blowers which formerly were regulated by other orders.

★ ★ ★

Manufacturers of all types of cast iron heating boilers have been permitted by OPA to increase their maximum prices by 10.5 per cent. This change is effected by an amendment to MPR 272.

★ ★ ★

SULPHURIC acid production in the United States has reached a new high, annual capacity being about 9,300,000 tons, with facilities for an additional 800,000 tons under construction.

★ ★ ★

Machine tool shipments in January totaled $57,001,000, *off about 6 per cent from December and comparing with the peak in December,* 1942, *of* $131,960,000. *Shipments are running close to twice the amount of new business less cancellations, and backlogs as of Jan. 31 were down to* $182,333,000.

W.G.G.

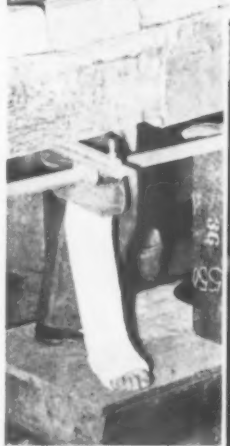
Broken Leg Fails To Daunt Foundryman

Walter C. Wolfe, cupola tender at the Elkhart, Ind., plant of the Chicago Hardware Foundry Co., recently was honored by the Gray Iron Founders' Society, which presented him a $100 war bond and a citation "for outstanding service to the Nation and the gray iron foundry industry beyond the call of duty."

Occasion for the recognition was Mr. Wolfe's refusal to permit a fractured leg to keep him away from his job in the face of the manpower shortage. Despite the injury—incurred while on overtime duty last fall—he insisted that he be permitted to be at his post each day at least long enough to tap the cupola. And for weeks, with a walking cast on his fractured leg, Mr. Wolfe hobbled to his post.

The award was made at the Elkhart plant on the evening of Feb. 16 by Walter L. Seelbach, Forest City Foundries Co., and president of the Gray Iron Founders' Society. In addition, the Michiana Chapter of the American Foundrymen's Association presented a war bond to Mr. Wolfe with its "commendation to a distinguished soldier of the war production front who has served his country and his plant loyally." V. C. Bruce, Buckeye Products Co., and vice chairman of the Michiana Chapter, made the presentation. From his fellow workers, who attended the ceremony in force, Mr. Wolfe received a gift of fishing tackle, presented by Lee Masters.

Shown below at the presentation ceremony, left to right, are: Mr. Bruce; A. J. Edgar, technical adviser, Gray Iron Founders' Society; Mr. Seelbach; E. B. Sherwin, president, Chicago Hardware Foundry Co.; Mr. Wolfe; K. A. Nelson, manager, Elkhart Division, Chicago Hardware Foundry Co.; F. J. Sherwin, vice president, Chicago Hardware Foundry Co., and Austin Gildea, Elkhart city attorney.



Book Review

Illustrated Technical Dictionary; edited by Maxim Newmark; 352 pages; published by the Philosophical Library, New York. Price $5.00

This book presents standard technical definitions of current terms in the applied sciences, graphic and industrial arts and mechanical trades, including air navigation, meteorology, ship building, synthetics and plastics, also technical data, interconversion tables and 90 illustrations. While the book covers an immense field and represents a vast amount of work, it is to be regretted that the compiler practically ignored the foundry field.

New Chicago Office

Newaygo Engineering Co., Newaygo, Mich., has established an engineering and sales office in Chicago at 100 West Monroe Street under supervision of A. H. Volk, until recently sales manager, the Trimount Instrument Co., Chicago, and for 18 years associated with the Beardsley & Piper Co., Chicago, as engineering and sales manager.

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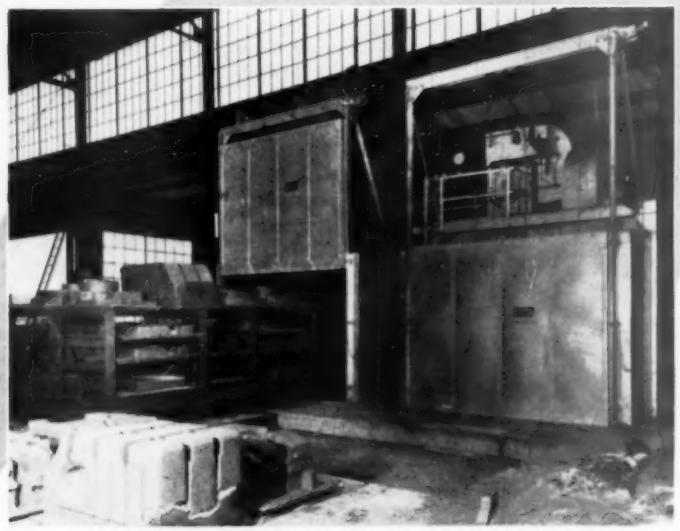

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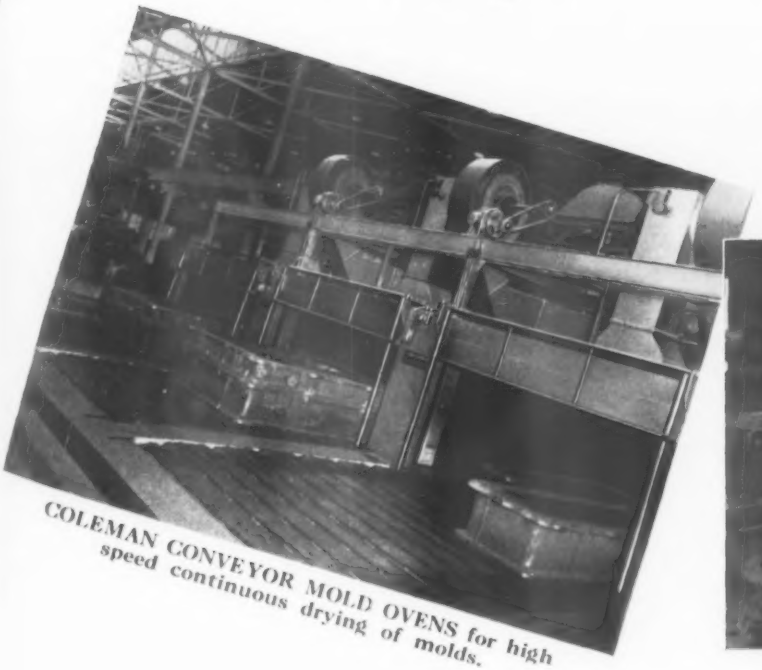

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activities of foundry GROUPS

Rochester

MARCH 8 meeting of the Rochester Chapter of the A.F.A., held at the University of Rochester, was devoted to nonferrous foundry practice. About 50 were present, and Charles Vaughn, Ritter Co., and vice president of the chapter, discussed recent trends in the metallurgy of aluminum alloys—particularly those of the heat treatable type. Refinements in melting practice with controlled furnace atmospheres have tended to step up the quality which is so essential in present day aircraft production. X-ray also has taken a prominent place in nonferrous production not only as a means of detecting hidden defects, but also as a practical tool for control in production.

Correct molding sand preparation and the proper design and placing of gates and risers, have a marked effect on the physical properties of the finished castings, and it is essential that newly designed castings be studied carefully to assure a product free from internal defects or contamination. Controlled heat treatment in addition to proper foundry practice, also has aided materially in improvement of physical structures. Next meeting of the chapter is scheduled for April 5 at the university, and will be devoted to a discussion of steel castings. Howard F. Taylor, department of physical metallurgy, Naval Research Laboratories, Washington, will be the speaker. —*Donald E. Webster, secretary-treasurer.*

Western New York

EMIL A. PIPER, Pohlman Foundry Co., Buffalo, was the principal speaker at the regular monthly meeting of the Western New York Chapter of the A.F.A. held March 3 at the Hotel Touraine. About 125 members and guests attended. Frank E. Bates, chapter chairman, presided, with Theodore H. Burke, Otis Elevator Co., acting as technical chairman.

Speaking on the subject, "Casting Design," Mr. Piper said that design is one of the greatest variables in the foundry, causing many defective castings, but that relatively little is done about it. He pointed out that the plastic and welding industries have educated their customers in proper design, but the foundry industry has been lax in this education. Slides were shown illustrating the efforts made by the welding industry to promote the use of welded products in preference to castings. To counteract this propaganda, the speaker showed several slides illustrating the difference in cost of the same design in cast and welded form, with the welding material costing two to three times as much as the casting.

Engineering problems involved in the design types of castings were discussed with special emphasis on castings which must have maximum stress resistance. Elementary laws of the equilibrium forces were used for application in the analysis of casting stresses. While there are several stresses present in each job, the two forces of tension and compression must equalize each other. The last member of a casting to solidify is always in tension strain. By means of other slides, the speaker pointed out practical examples of how castings have been redesigned to eliminate losses from tearing, cracking and distortion.

The Western New York Chapter held a panel discussion on general foundry problems at the second War Production Conference held in Buffalo Feb. 28. James L. Yates, Worthington Pump & Machinery Corp., was panel chairman, and discussion leaders were as follows:

Steel—James P. Begley, Pratt & Letchworth Co. Inc., and Joseph H. Sander, American Radiator & Standard Sanitary Corp.; Gray Iron—Emil A. Piper, Pohlman Foundry Co. Inc., and John C. Goetz, Acme Steel & Malleable Iron Works; Aluminum, Magnesium—Harold R. King, Metal & Alloy Specialties Co. Inc., and John C. McCallum, McCallum-Hatch Bronze Co. Inc.

A fine display of steel casting photomicrographs, x-ray pictures and foundry scenes was supplied by Pratt & Letchworth Co. Inc. and American Radiator & Standard Sanitary Corp. The program attracted an audience of about 100.—*J. Ralph Turner, secretary.*

Toledo

LEIGHTON M. LONG, Battelle Memorial Institute, Columbus, O., who has been assigned to various research supervisory duties with the War Metallurgy Board, spoke at the Feb. 22 meeting of the Toledo Chapter of the A.F.A. and enumerated the many problems that have confronted producers of magnesium alloy castings. The example of cooperative effort in that field between design engineers, metallurgists and foundrymen might well be copied by all casting engineers.

Foundrymen should take a more active part in establishing specifications covering quality, according to Mr. Long. The separately cast test bar evaluation for castings must give way to mechanical test procedures that definitely measure the serviceability of the part. An excellent attendance was recorded despite the fog-bound weather. Mr. Long's talk brought forth considerable discussion during which it was brought out that members should submit their problems, of any nature, to the proper A.F.A. committee which will be more than willing to bring the problems into open discussion for the benefit of the industry.—*R. B. Bunting, secretary-treasurer.*

Chicago

ROUND-TABLE meetings continue to ring the bell for the Chicago Chapter of the A.F.A. Third such meeting of the current year's program, held at the Chicago Bar Association, March 6, set a new attendance record at over 250. Members participate freely in discussions and appear as willing to contribute useful information as to acquire it. Success of these round-tables is proof that the program committee was wise in alternating this type of program with general meetings throughout the year.

Gray Iron division devoted its attention to "Controlled Solidification—Gating and Heading", with Fred G. Sefing, development and research engineer, International Nickel Co. Inc., New York, as discussion leader. Elmer J. Carmody, foundry engineer, Charles C. Kawin Co., Chicago, was chairman.

"Gating, Risering and Pattern Rigging" was the subject considered by the Steel division. J. Edwin Johnson, supervisor, Continental Roll & Steel Foundry Co., East Chicago, Ind., was discussion leader, and H. A. Forsberg, general superintendent, same company, served as the chairman. The Pattern division joined with the Steel division in this session.

At the Nonferrous division, H. M. St. John, superintendent brass foundry, Crane Co., Chicago, was discussion leader, and Chester K. Faunt, works manager, Christensen & Olsen Foundry Co., Chicago, was chairman. Topic was "Pressure Castings in the Brass Foundry."

Chicago Chapter held its annual Ladies Night Party at the Terrace Casino of the Morrison hotel, Feb. 19. The 800 members and guests who joined in the frolic judged the party outstanding among such events in the past. Even the ladies who found themselves not holding lucky numbers in the generous distribution of war

(*Continued on page* 174)

BASKET!

In basketball—the country's most popular game—it's teamwork that wins. Profitable casting production takes teamwork, too—good men plus good methods and good materials.

MOGUL CEREAL BINDER . . . *saves binder costs;* reduces baking time and cleaning costs; increases oven capacity and core production . . . PRODUCES QUALITY CASTINGS.

MOGUL is a perfect Green Bond, which increases permeability in cores and bonds. MOGUL can be used in cores when both green and dry strengths are required.

MOGUL works with core oil, because it decreases drying time, and produces smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sand.

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Kordek is a perfect DRY BOND. Kordek can be used in smaller proportions than most dry binders. Produces better castings with fewer discards.

CORN PRODUCTS SALES CO.

17 BATTERY PLACE
NEW YORK 4, N. Y.

(*Continued from page* 172)

savings stamps expressed this opinion.

Next meeting of the chapter, on April 3, will be held at the Museum of Science and Industry in Jackson Park. Any misapprehension over the fact that a meeting was held there just a year ago should be dispelled by the management's assurance that 14 successive annual meetings could be arranged at the Museum without duplicating any previous tour.—*Erle F. Ross.*

Philadelphia

MONTHLY meeting of the Philadelphia Chapter of the A.F.A. was held Feb. 11, at the Engineers Club, Philadelphia. Despite the very bad weather, 125 members and guests were present to inaugurate the first round-table discussion ever held by the Philadelphia Chapter.

Following the dinner, the membership was divided into three separate groups. One was interested in gray iron, one in nonferrous, and another in steel. They were assigned separate rooms and had as discussion leaders, B. A. Miller, Cramp Brass Iron Foundry, on gray iron; William Grimm, Crown Smelting Co., on nonferrous, and H. D. Phillips, Lebanon Steel Foundry, on steel.

E. W. Horlebein, Gibson & Kirk Co., Baltimore, acted as technical chairman for the entire group. Mr. Horlebein, past president of the Chesapeake Chapter, who had previous experience on round-table discussions, very ably handled his part of the meeting.

It was the consensus of the majority that this meeting was one of the most successful that the Philadelphia Chapter has ever held. In fact, it was voted to continue the same sessions, where they left off, at an early future date.—*William S. Thomas, chairman, publicity committee.*

New Jersey

AN ENCOURAGING postwar prospect for the gray iron industry was sketched by Donald J. Reese, chief, Manufacture and Foundry Products Section, Steel Division, War Production Board, in a talk before the New Jersey Foundrymen's Association, at its dinner meeting at the Down Town Club, Newark, N. J., Feb. 28.

Stressing the importance of a more progressive promotional program on the part of the gray iron industry, he said that he "hasn't any fear about the future of gray iron, if engineers are given all the information needed in designing their end-use products."

Within the past 25 years, he declared, the gray iron industry has made greater progress than in any other previous period. With good leadership, the industry should continue to progress, he believes.

The future of gray iron, Mr. Reese pointed out, will be proportional in a large measure to the progress being made by the foundry industry as a whole. "If an aluminum casting fails," he said, "don't think it doesn't reflect on all the foundry industry, for it does."

He cited figures which showed that gray iron had lost some ground since 1941. In that year, according to certain estimates, he said, gray iron production was around 11,000,000 tons, against 9,400,000 tons in 1942 and 9,300,000 tons in 1943. However, he thought that performance was good in the light of the number of civilian uses which have been greatly curtailed, and the fact that early in the war gray iron lost to steel in a number of war applications. Recently, he agreed, gray iron has regained some of the business lost to steel and also to malleable and bronze.

Steel casting production has increased sharply as a result of war demand, and the number of steel foundries has increased from around 250 before the war to 350 at present, a gain of approximately 100. In passing, he remarked, that fewer heavy steel castings would likely be produced this year. He doubted if the average would exceed 1000 pounds. Nevertheless the number of castings produced would be greater, he thought.

Malleable production in 1942 was less than in 1941 but took a sharp spurt in 1943 as a result of the substitution for bronze and brass in many cases. Considerable malleable, he pointed out, went into machine gun mounts. Malleable also found greater use as a substitute for steel forgings. More recently there has been a greater demand for army trucks and railroad and agricultural equipment.

The number of producers of malleable has increased slightly during the war from 110 to 112, a gain of only 2. However, many companies have and are expanding and the completion of this program will see an increase of approximately 150,000 tons in capacity. Incidentally, he pointed out that about 90 per cent of the malleable production last year was by the duplex process.

Mr. Reese declared that expansion in light metals capacity has been particularly heavy. In magnesium just prior to the outbreak of war in Europe in 1939, capacity was around 10,000,000 pounds; by 1944 it had been increased to 500,000,000 pounds. But prices should prove a handicap in competition with other castings. Current prices average about 20½ cents, with the great proportion of output costing much more. In fact, he doubted if more than 100,000,000 pounds would be produced this year at a profit at the 20½ cents a pound price, indicating that once things became normal much of current production would go by the wayside. He said the government has financed 94 per cent of the magnesium production.

Aluminum capacity just prior to the war ran around 300,000,000 pounds. Today capacity is about 7½ times that. The current price, he pointed out, is about 15 cents, but he was confident that some of the aluminum being produced costs in excess of this amount. About 50 per cent of present capacity has been government financed.

Referring to plastics, he said, production is now 15 times greater than before the war, but that prices range 20 cents per pound and up, for the most part. Hence, even where competitive as to

(*Continued on page* 176)

EXCHANGE PAPER PREVIEW: Addressing a recent meeting of the Peoria Chapter of the Society of Automotive Engineers, M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., presented a preview of the 1944 *A.F.A. exchange paper to the Institute of British Foundrymen. Mr. Gregory's paper describes practice and equipment utilized in the production of aluminum castings for air-cooled engines. Shown, left to right, are: E. W. Jackson, assistant to the president, Caterpillar Tractor Co.; William H. Radford, associate director of research for Caterpillar, and Mr. Gregory. Cylinder head at right is for a diesel engine, that at left for a gas engine. The model represents a fin body coremaking unit*

WHAT AJAX SIGNIFIES

AJAX METAL COMPANY

AJAX NON-FERROUS INGOT METALS: The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company 45 years ago. The result continues to be a sense of sureness and satisfaction in all the dealings of foundrymen with this company. **Philadelphia, Pa.**

AJAX ELECTRIC FURNACE CORP.

Division of Ajax Metal Co.

AJAX-WYATT INDUCTION MELTING FURNACES: Virtually all the brass mills in North America use these furnaces because they have the lowest metal losses in the field—less than 1%—with superior temperature control and unapproached economy of operation on high production schedules such as we have today. **Philadelphia, Pa.**

AJAX ELECTROTHERMIC CORP.

Division of Ajax Metal Co.

HIGH-FREQUENCY MELTING AND HEATING: Development of high frequency melting and induction heating as early as 1916 represents a basic contribution of Ajax research to metallurgical art. Use of Ajax-Northrup units is the trend in melting high alloy tool steels, magnet steels; for centrifugal castings; and heating for hot-forming. **Trenton, N. J.**

AJAX ELECTRIC CO., INC.

Division of Ajax Metal Co.

AJAX-HULTGREN SALT BATH FURNACES: Over a thousand of these furnaces have been installed. For practically every heat-treating operation from 300° F. to 2400° F., the Ajax-Hultgren Electric Salt Bath Furnace has definitely proved its advantages and received the acclaim of leading metallurgists throughout the world. **Philadelphia, Pa.**

AJAX ENGINEERING CORP.

Division of Ajax Metal Co.

ALUMINUM MELTING FURNACES: Advantages inherent in the original Ajax-Wyatt low-frequency melting principle and design are found in the Ajax-Tama-Wyatt furnace, incorporating original and specific features for aluminum melting, permitting production of homogeneous alloys with diminished oxidization and no danger of overheating or underheating. **Trenton, N. J.**

SINCE 1880

(*Continued from page* 174)

use, plastics will not make the inroads they might otherwise because of their cost.

Speaking generally, he thought the loss of ferrous castings to light metals after the war was going to be small. In fact, instead of providing competition, activity in these light metals might help by opening new fields and broadening markets.—*B. K. Price.*

E. Canada-Newfoundland

SUCCESSFUL results were experienced from the first group discussion program presented by the Eastern Canada-Newfoundland Chapter of the A.F.A. which was held at the Mount Royal Hotel, Montreal, Feb. 18. The meeting appeared doomed to failure due to a sudden strike of all tramway and bus services, but such was the interest and enthusiasm that 99 members and guests attended, many of them at considerable inconvenience and with doubt as to means of getting home.

Four groups—steel, gray iron, bronze, and French-speaking on general foundry problems—met in separate rooms. The French-speaking group was the largest with about 45 present, steel next with 27, gray iron and bronze about equally dividing the remainder. Chairmen and discussion leaders in each group did splendid work, and many gated castings were brought in and discussed thoroughly along with related foundry topics.

Preparations are going forward for a two-day conference in Nova Scotia, and preliminary indications are that this will be well attended by representatives from all provinces in the chapter's territory.

Chapter membership has passed the goal set for the season of 250 by an extra 3 and Chairman Delahunt has called for an extension of the original objective to 275.—*A. E. Cartwright.*

Reading

JOHN N. LUDWIG JR., metallurgist for the Electro Metallurgical Co., New York, addressed the monthly meeting of the Reading Foundrymen's Association held at the Berkshire Hotel, Reading, Pa., on Feb. 15. J. M. Robb Jr. presided with about 75 members and guests present.

Lessons learned in producing uniform castings for the Army and Navy will be the salvation of the cast iron industry, Mr. Ludwig told his audience. Speaking on a study of the characteristics of cast iron, the influence of these characteristics on the physical properties of the iron, and their control, Mr. Ludwig said that today there is more regard for carbon situation and a better understanding of the physical properties of cast iron with a definite trend toward absolute control.

He said that there has been a tendency to regard the metallurgist as "being up in the sky;" that all are familiar with the functions of the sales department, the purchasing department and other departments, while the metallurgist is overlooked. He said the metallurgist should know the composition of the scrap pile to arrive at the proper diagnosis of the amount of carbon, silicon and manganese to be added to a given heat.

On the necessity for close supervision, the speaker said that many plants respond differently to identical treatments, and that varying results are obtained on different days. "The only way a uniform product can be produced," he said, "is by close regulation. The design should be changed constantly to meet requirements. A study in one large eastern foundry showed that with present-day knowledge, the curve on thousands of tests run could be made almost uniform, eliminating waste in the number of rejections normally to be expected." Mr. Ludwig illustrated his talk with slides.—*H. C. Cummings, secretary.*

Ontario

FURNACE operation was the subject of discussion by the gray iron, malleable and nonferrous sections of the Ontario Chapter of the A.F.A. at a recent meeting in Hamilton. Under the chairmanship of W. J. Brill, Canadian General Electric Co., Ltd., R. C. Vollick, Canadian Westinghouse Co., Ltd., outlined practices on furnaces in the Westinghouse foundry dealing especially with a 32-inch front slagging spout cupola melting continuously to supply metal for mechanical molding units.

The nonferrous section held an interesting round-table discussion under the leadership of G. C. Loach, Otis-Fenson Elevator Co., Ltd. A questionnaire prepared by M. E. McKinney, International Harvester Co. of Canada, Ltd., leader of the malleable group, brought a lively discussion and many interesting answers, including the following:

Unanimous opinion favored partial instead of total removal of bungs for charging. The best arrangement for placing the different materials in the furnace is sprue on the bottom, then annealed or shop scrap, then pig iron with steel scrap on top at about the middle of the furnace.

Furnaces are not equipped with coal or air weight indicators. Coal feed is indicated by feed screw revolutions. Air is indicated by fan gate openings. All present had a definite firing schedule at the start of the heat and followed this schedule religiously. They also agreed that the sooner a heat is worked or poked down, the faster it will melt. Slagging as soon as possible was deemed the most advisable. This accelerates the heating up. During the heat, coal-air ratios are regulated by visual appreciation of the flame aspect. This feature is left to the judgment of the operator.

All present take preliminary tests for analysis as soon as the iron is reasonably hot. Heats are poured from 1 to 1½ hours after this test is taken. Unanimous test for pouring temperature is the time necessary for a test ladle of iron to *skin over.* This time may vary from 25 to 57 seconds. Some foundries observe a definite firing schedule, while others leave this detail to the judgment of the operator. A little iron left in the furnace after the heat does no great harm. Larger quantities increase melting time and oxidation. Respective merits of stopping the tap hole with clay or with cores precipitated a lively discussion. The ultimate aim of all melting is production of hot iron of the desired composition ready to pour at the right time. Labor, fuel and refractory costs are a secondary consideration.

No one was sure of coal-air ratios because duplication of results was not always forthcoming. This greatly was due to the fact that feed screw speeds could not be indicative of the supply of usable calorific value in the form of coal, this latter depending on size, quality and moisture content, also on height of coal above the screw.

The importance of proper sand mixtures and their accurate control was emphasized in the address of E. George Brewer, sales manager, Taggart & Co., Philadelphia, before the Jan. 28 meeting of the Ontario Chapter at Hamilton.

Mr. Brewer introduced his subject by discussing suitable sand for casting a plate 2 inches thick, and proceeded to show the effect of certain ingredients upon the sand mix and to emphasize certain points that should be watched carefully. For the plate casting, the speaker suggested sand with 5 to 6 per cent moisture (moisture not over the temper point), permeability of 75 to 100, and green strength of about 8 pounds. In the preparation of a sand for such a job the seacoal should be selected to match the sand, Mr. Brewer said. In this instance, C. grade seacoal will not reduce the permeability of the sand too much and will burn at a sufficiently slow rate.

Discussing the use of pitch in dry sand work, the speaker stated that too much pitch has a deleterious action on dry sand. Where a high proportion of pitch is used, such as 1 to 10, the sand grains become glazed by the pitch compound. Tests conducted on the strength of dry sand containing a reasonable amount of pitch have indicated clearly that dry sand does not lose its strength as rapidly as believed by many foundrymen.

Special emphasis was placed upon the necessity for accurate control of sand moisture. One plant experiencing trouble with engine castings produced in dry sand found that two of the molders were wet spraying the molds. When this practice was discontinued, no further trouble was encountered. At the temper point, sand feels neither too wet nor too dry, and green sand reaches the peak of its properties.

Brass foundries were rated by the speaker as paying less attention than anyone else to their heap sand. Little sand control is practiced in brass foundries, and most plants use sand too fine

(*Continued on page* 179)

Foundry Alloys

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FERRO-MOLYBDENUM
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CALCIUM MOLYBDATE

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Unsparing effort in research and constant study of results among users have enabled the Molybdenum Corporation to produce alloying materials that are everywhere approved. The technicians of the Corporation are prepared to give advice on the varied uses of Molybdenum and Tungsten in iron and steel. They are widely consulted on the newly discovered uses of Boron in malleable iron, cast iron, and cast steel. The Corporation has developed and patented a special Ferro-Boron which dissolves easily in molten metal and gives a high recovery. Your inquiries will receive thoughtful attention.

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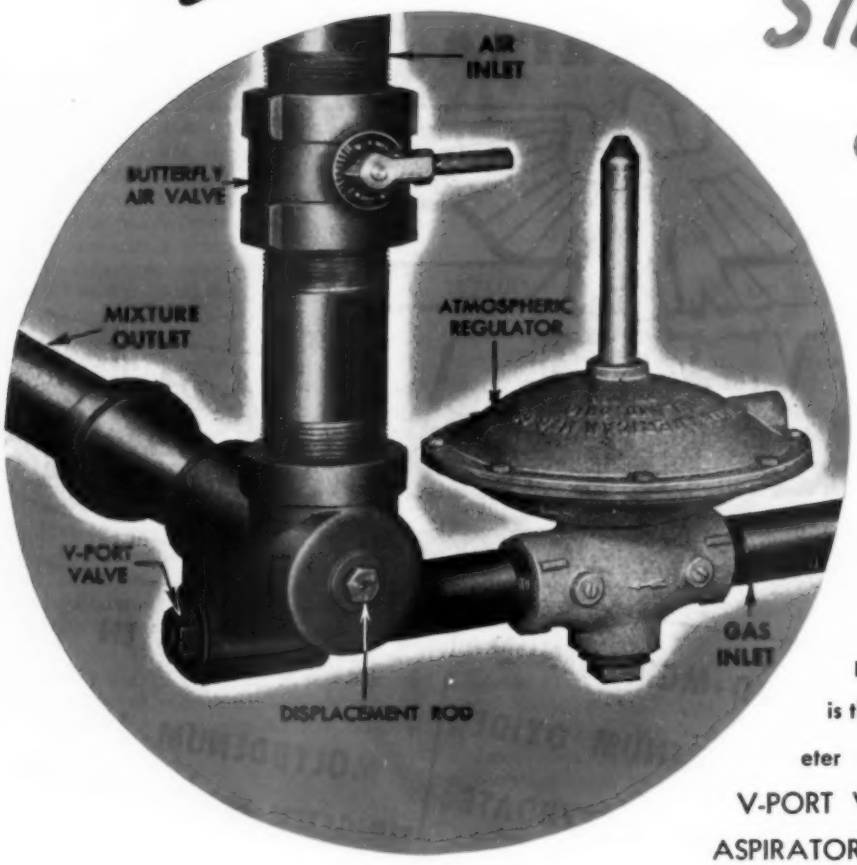
GRANT BUILDING **PITTSBURGH, PA.**

for FLEXIBILITY *and* ACCURACY
use NORTH AMERICAN *Single Valve*
GAS BURNER CONTROL

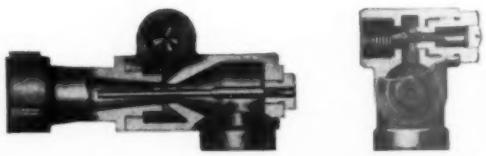


The precision-built NORTH AMERICAN ATMOSPHERIC REGULATOR reduces a varying inlet gas pressure to atmospheric pressure. The exact gas-air ratio desired is then easily set by the micrometer adjustment of the V-PORT VALVE in the ASPIRATOR MIXER.

For information on Regulators, see Bulletin No. 15; Mixers, No. 65; Butterfly Valves, No. 25.

The compact NORTH AMERICAN BUTTERFLY AIR VALVE with its graduated dial and locking device becomes the single and positive control of the amount of fire.

Principle of the system is the fact that the suction developed by the ASPIRATOR MIXER upon the gas supply is proportional to the amount of air passing through the mixer. DISPLACEMENT RODS of varying diameter are furnished in the mixer for different effective burner areas. Rods can readily be changed when necessary without breaking into the piping.



Sectional View of Patented North American Aspirator Mixer Showing Interchangeable Displacement Rod and V-Port Adjustment.

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

(*Continued from page* 176)

for the work they are doing. Some brass production foundries have increased permeability and are securing better feeding of risers and coaxing shrinks up into the risers. In conclusion Mr. Brewer warned that water was the greatest evil in the foundry industry, accounting for 90 per cent of foundry losses.—*G. L. White, secretary-treasurer.*

St. Louis

REGULAR monthly meeting of the St. Louis Chapter of the A.F.A. was held at the De Soto hotel, St. Louis, Feb. 10. Due to the absence of Chairman L. A. Kleber, Vice-Chairman E. Eugene Ballard presided. Dinner was followed by 30 minutes of War Department sound films.

After reports of committees were submitted the meeting broke up into three round-table discussions under the leadership of the following:

Steel—Chairman, Roland T. Leisk, assistant works manager, American Steel Foundries, E. St. Louis, Ill.; discussion leader, George T. Baebler, Key Co., E. St. Louis.; subject, "Sand Control in a Continuous Operation Steel Foundry."

Gray Iron—Chairman, C. B. Shanley, vice president, Semi-Steel Casting Co., St. Louis; subject, "Gating and Risering of Gray and Alloyed Iron Castings."

Nonferrous — Chairman, Francis T. O'Hare, president, Central Brass & Aluminum Foundry Co., St. Louis; discussion leader, William M. Baxter, plant metallurgist, National Bearing Metals Corp., St. Louis; subject, "Temperature and Analysis Control of Brass and Bronze."

Interest in this type of meeting was shown by the fact that all three meetings ran past the usual adjournment time.—*J. H. Williamson, secretary-treasurer.*

Northeastern Ohio

APPOINTMENT of nominating and auditing committees, tricks of illusion and magic, and an address on the subject of good housekeeping featured the March 9 meeting of the Northeastern Ohio Chapter of the A.F.A. at the Cleveland Club. For auditing committee Chairman J. G. Goldie appointed J. J. Witenhafer, Lake City Malleable Iron Co.; Leon Miller, Osborn Mfg. Co.; and Frank Dost, Sterling Foundry Co. For a nominating committee to prepare a slate of officers and directors for the coming year the chairman named Jack Tressler, Hickman, Williams & Co.; Benjamin D. Fuller, Whitehead Bros.; Elmer Zirzow, National Malleable & Steel Castings Co.; Frank Barton, Fulton Foundry & Machine Co.; and Marcel Reyman, Atlantic Foundry.

For the entertainment feature of the evening Jack Lathrop, advertising manager THE FOUNDRY and secretary of the chapter, announced that a popular belief to the effect that the hand is quicker than the eye is entirely erroneous and mistaken. For the following half hour, in demonstrating his claim, he juggled cards and various gadgets and contrivances in a manner that left the spectators convinced in their former belief. One member boldly asserted that if the hand is not quicker than the eye, the speaker certainly needed a new pair of glasses.

Fortified with various pieces of apparatus, the main speaker of the meeting, DeWitt Huffman, associated with the Division of Safety and Hygiene, Industrial Commission of Ohio as safety engineer, presented an interesting talk on the general subject of good housekeeping in the foundry, with particular reference to safety and hygiene. He admitted that probably the majority of foundries are familiar with the dust hazard and have provided equipment to cope with the problem at the shakeout and in the casting cleaning room where the largest volume of dust is generated. The speaker devoted the concluding part of his address to descriptions of methods which have been found efficacious in maintaining a clean atmosphere.—*Pat Dwyer.*

Southern California

ALTHOUGH the attendance was somewhat smaller than on previous meetings the members of the Southern California chapter of the A.F.A. had interesting and enjoyable meetings, in both January and February, at the Elks Club in Los Angeles.

Highlight of the January meeting was an illustrated talk on methods of dust control in the foundry.

In February the attention was held during a talk on shakeouts in the foundry plus movies of the product in action. One of the main events of the evening however, came when several "A.F.A. Songsters" rose to the occasion and entertained their fellow members with some favorite songs accompanied by the accordion player. We are of the opinion that nearly all members enjoy seeing and hearing members of their own organization, flavored here and there with group singing of old favorites under the direction of a good song leader. At any rate the February meeting will be remembered for some time to come.—*Blaine Bender, publicity.*

Western Michigan

RECORD attendance marked the Feb. 14 meeting of the Western Michigan Chapter of the A.F.A. at the Hotel Ferry, Grand Haven, Mich., with 109 members and guests present.

J. J. Boland, Griffin Wheel Co., Chicago, was the speaker of the evening, his subject being "Relationship of Sand Control to Better Castings". Mr. Boland reviewed the history of sand control development in the Griffin Wheel foundries, and cited significant reductions in scrap due to molding and sand practice in the period between 1935 and 1943. He said, "Give the sand the attention that sand deserves and the results in the cleaning room will be astounding."—*C. H. Cousineau, secretary.*

Quad-City

QUAD CITY Chapter of the A.F.A. held its regular monthly meeting at Fort Armstrong Hotel, Rock Island on Feb. 21. Eighty-two members and guests were present. Following dinner a moving picture review of the construction of the Alcan highway was shown.

Speaker of the evening was George A. Schumacher, assistant to the general manager, Benton Harbor Malleable Industries, Benton Harbor, Mich., whose subject was "Melting and Annealing of Malleable Iron".

Mr. Schumacher reviewed his 23 years of experience in the malleable industry, starting with the old hand-fired air furnace days, down through the powdered-coal-fired air furnace to the present duplexing system. He stressed the value of the present practice of exchanging technical information in contrast to the secrecy of the old days. The speaker outlined the tremendous savings and improvement in quality achieved through use of the duplexing method. He stressed further the importance of making chemical analysis on each incoming shipment of raw material. Because of the occasional appearance of foreign elements in some of the raw materials, particularly scrap, complete supervision was recommended as a means of eliminating serious trouble later.

The annealing of malleable iron was discussed at some length, and a review was made of annealing cycles, in which it was pointed out that the present day cycle of 32 to 40 hours is a remarkable contrast to the old period of about 10 days.—*H. L. Creps, secretary-treasurer.*

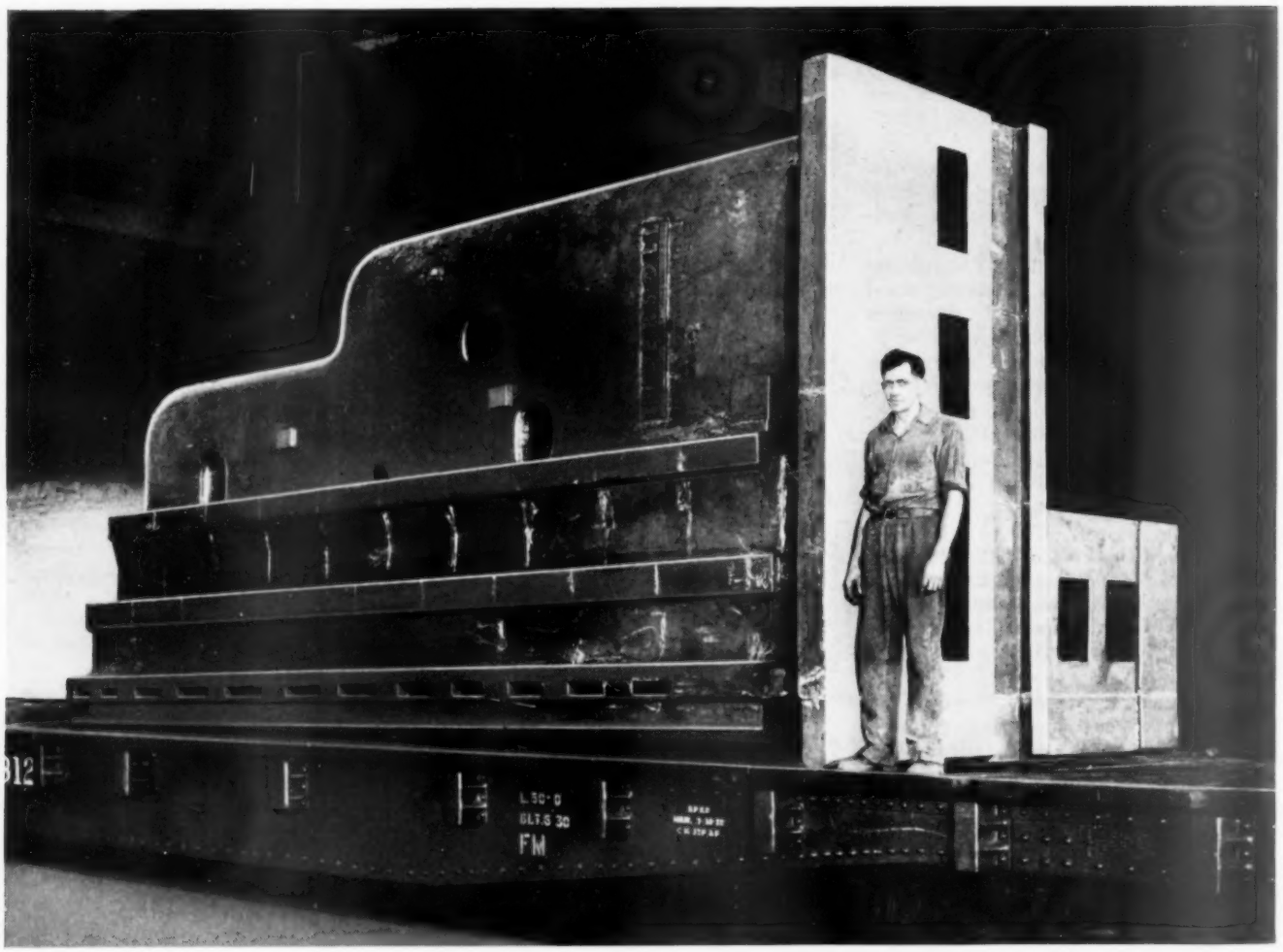
New England

JOSEPH NIXON, Whitehead Metal Products Co., Buffalo, addressed an unusually large audience at the regular meeting of the New England Foundrymen's Association held at the Engineers Club, Boston, March 8. His paper on "Factors in the Production of Sound Castings with Particular Reference to Gating and Risering" was illustrated by some 40 slides and provoked considerable discussion. Mr. Nixon is a well known foundryman, having been connected with the industry since boyhood. He worked in Canadian foundries from Nova Scotia to the Pacific coast; later in various foundries in the United States, and became associated with Whitehead Metal Products Co. in 1930 as foundry engineer.

Mr. Nixon outlined the necessity of going to great lengths in the foundry to

(*Concluded on page* 182)

Regardless of metal poured, or size of castings . .



View of semi-steel housing casting for milling machine . . . weight 85,000 pounds, dimensions, 22 feet long, 10 feet wide and 12 feet deep. Velsicol Core Oils are used to produce huge castings such as the one pictured, down to the smallest pin casting.

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VELSICOL Resin Type CORE OIL

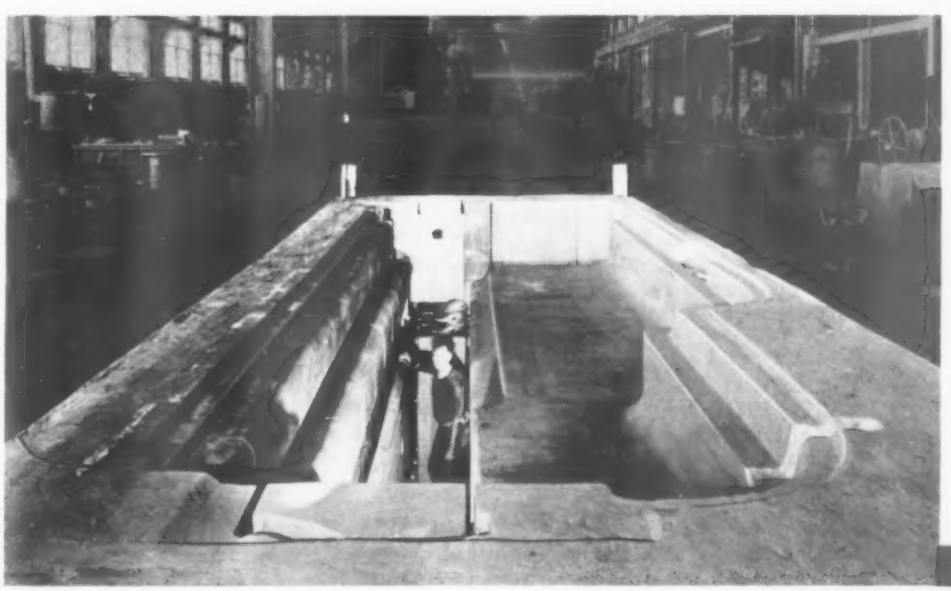
will meet YOUR FOUNDRY NEEDS

Steel, grey iron, malleable iron, aluminum, magnesium, or brass—which metal do you pour? Do you produce large or small castings? No matter what the individual requirements are in your foundry, VELSICOL CORE OIL, a modified resin type, can be made to meet your needs.

VELSICOL CORE OILS provide the desired core strength at low binding cost . . . they minimize gas content . . . they assure fast baking, rapid collapsibility and shorter cleaning time. These are the features that speed production!

VELSICOL specializes in the manufacturing of oxidizing resins. Velsicol Core Oils based on these resins fulfill the highest standards of foundry practice. You can depend on their uniformity due to our rigid control.

Test VELSICOL resin type core oil in your own foundry. Write for samples now! Velsicol Core Oil will meet your individual foundry needs.



Cores used in this mold varied in size from 1½ inches to 7 feet wide, and from 6 inches to 12 feet long.

(*Concluded from page* 179)
insure sound castings. Slides showing proper and improper risering of various types of castings illustrated his point. He recommended the study of where to put the riser as well as how large a riser is necessary for the job. He also showed how the number of risers could be cut down by proper gating, and how in some cases risers could be eliminated if conditions of directional solidification were studied.

Risers should be filled at all times. The practice of partially filling and returning to add metal later, was not to be recommended. Proper use of chills is good practice. One series of pictures showed a large casting with many risers and multiple gates made sounder by eliminating most of the risers and using one gate which entered a riser.

Several illustrations were given of brass castings containing blow holes caused by hard cores. A common practice in producing sound castings is by gating through a strainer core into the bottom of a riser with a horn gate. Design is responsible for many failures as evidenced by cut-up sections of castings showing unnecessarily heavy sections adjoining lighter ones.

In general, the speaker recommended staying clear of risers on top of castings, using chills generously, gating into side risers, pouring from the bottom, and in cases of tall castings, arranging for hot metal to enter the mold at more than one place up the side.

President T. C. Weiser of the New England Foundrymen's Association called attention to the coming A.F.A. convention at Buffalo and asked that those who planned to go get in touch at once with A. S. Wright of the Hunt-Spiller Mfg. Corp. who is chairman of the transportation committee.

Next regular meeting of the New England group will be held April 12 at the Engineers Club, Boston. Guest speaker is to be John N. Ludwig Jr., Electro-Metallurgical Sales Corp., New York, who will speak on "Metallurgical Control in the Foundry."—*Merton A. Hosmer.*

Pittsburgh

ONE of the largest crowds at any regular technical session of the Pittsburgh Foundrymen's Association turned out Feb. 21 to hear G. H. Blackburn, Walworth Co., Greensburg, Pa., discuss radiography in the foundry. Mr. Blackburn's experience with the subject, particularly with steel castings, provided an interesting and thought-provoking session. A series of slides, showing case histories of actual production castings, demonstrated how the use of radiography changed foundry practices and in some cases effected changes in casting designs to avoid defects.

Constant use of both x-ray and radium equipment at the Walworth Greensburg foundry has resulted in the use of this new foundry tool as a means of improving production methods as well as a careful inspector. In many cases where a number of identical castings were to be made, the first casting off the line showed defects which were corrected by changes in practice. Rapid radiography made it possible to eliminate causes of these defects in a relatively short time, and resulted in a much lower reject rate on the entire lot.

The speaker outlined the methods in use at his shop in making both x-ray and gamma ray inspections. Slides showed how both large and small castings were photographed, as well as the methods used for a number of similar castings—an "assembly line" system of radiography in cases where each casting required a test.

E. C. Buerkle, association president, presided, and M. J. Kellner, chairman, steel committee, introduced the speaker. —*R. L. Hartford*

Cincinnati

BAD weather held down attendance at the Feb. 14 meeting of the Cincinnati Chapter of the A.F.A. to about 50 members and guests. W. A. Rengering, Cincinnati Milling Machine Co., chapter vice chairman, presided.

V. A. Crosby, Climax Molybdenum Co., Detroit, was the principal speaker, discussing "Factors Affecting the Properties of Cast Iron". By the use of slides, charts and graphs, Mr. Crosby explained how various physical properties of cast iron are effected by its micro-constituents. He then detailed how to produce these constituents by proper melting, alloy additions and heat treatment. A lively discussion period followed the address.—*Martin F. Milligan, secretary.*

Central Indiana

REGULAR monthly meeting of the Central Indiana Chapter of the A. F. A., held at the Athenaeum, Indianapolis, Feb. 7, had an attendance of about 75 members and guests. The speaker was E. T. Kindt, president, Kindt-Collins Co., Cleveland. Mr. Kindt discussed the value of the patternmaker to the foundry and how savings may be effected through the use of proper technique and equipment. His talk was illustrated by motion pictures showing the correct way to make patterns and how to use patternmaking equipment. He also discussed general trends in the pattern industry itself.

Directors of the chapter have approved the purchase of a $500 War Bond from the chapter treasury.

R. F. Lincoln, formerly sales manager of the molding machine division, Osborn Mfg. Co., Cleveland, discussed core blowing methods and equipment before the March 6 meeting of the Central Indiana Chapter of the A. F. A., at Indianapolis. Mr. Lincoln illustrated his talk with slides, explaining the principles of core blowing, the venting of core boxes, sand mixtures to be used in blowing cores, and the most economical air pressures to use. More than 70 members and guests attended the meeting.—*Robert Langsenkamp, secretary.*

Northern California

NORTHERN California Chapter of the A.F.A. held its Feb. 11 meeting at the Claremont Hotel, Berkeley, with more than 120 members and guests attending. President Harry A. Bossi presided at the meeting. The principal speaker, Ned M. Briskin, Permanente Metals Corp., used numerous slides to illustrate his talk on "Magnesium Sand Castings". There was much interest shown as indicated by the many questions which prolonged the meeting until 10:45 p. m.

At an earlier meeting of directors, purchase of two more War Bonds was authorized, making a total of $400 which the chapter has invested to help guarantee early victory.—*George L. Kennard, secretary.*

Wisconsin Conference

(*Concluded from page* 164)
a day or more each week in a vocational school, the instruction should be confined strictly to technical features. Instruction and practice in handling the tools and making the patterns should be confined to the shop. One employer complained that he was hindered in his effort to grade his men properly according to ability. An arbitrary labor ruling in his plant graded the rates of pay according to years in service.

Concluding meeting of the conference was a session on core blowing for all branches of the industry. M. J. Gregory, Caterpillar Tractor Co., Peoria, Ill., spoke briefly on the wide range of cores that can be blown, and the advantages of using such equipment. He introduced Z. Madacey of his firm who presented a description of the different types of cores blown in the Caterpillar foundry. Those range from small light cores to extremely heavy cores. Following Mr. Madacey's talk a motion picture was shown of the plant and practices employed by Caterpillar Tractor in making deep-finned aluminum cylinder heads for aircraft engines.

Boron in Malleable

(*Concluded from page* 129)
of malleable castings. It is hoped that none of the readers of this brief description will expect to work miracles in the way of cutting annealing time, using totally unsuitable material and otherwise taking unwarranted liberties with their operating processes and hoping to overcome all of these by the addition of this insignificant amount of an alloy element.

United States Foundry Corp., Kalamazoo, Mich., suffered an estimated $150,000 loss by fire Feb. 5.

120 AIR CHANGES *PER MINUTE* IN THE NEW ROSS HEAT TREAT OVEN *For TUBE TURNS, INC.*

One reason for the small temperature difference of ±2° F. obtained in the ROSS Automatic Heat Treat Ovens for Magnesium and Aluminum is the use of enormous volumes of properly distributed air.

The above photograph shows the specially designed STURTEVANT High Temperature Axiflow Fans assembled for shipment to TUBE TURNS, INC., where they were used on a battery of ROSS Ovens for Heat Treating Aluminum Forgings.

SOME OTHER USERS OF ROSS HEAT TREAT AND AGING OVENS INCLUDE:

Chevrolet Motor Company.
Chrysler Corporation.
National Aluminum Cylinder Head Co.
Pratt & Whitney Aircraft Corporation.
Packard Motor Company.
Reynolds Metals Company.
Wright Aeronautical Corp., and many others.

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CONTROL OF AIR FOR MODERN INDUSTRY

Foundry Developments

TO OBTAIN the best results in producing nonferrous castings one authority suggests that the following steps be considered in sequence: Design the mold with respect to position of casting in the mold; location of gates and risers; number of pieces on pattern plate; hydraulic head, and use of strainer core or choke gate. Attempt to control quality of metal at a level which can be maintained uniformly. If the fluidity varies the gating requirements also must vary. If necessary vary pouring temperature in an effort to compensate for variation in metal quality. If necessary vary number of molds poured from one pot of metal when pouring temperature change fails to compensate for metal quality variation. If difficulty encountered is too serious, endeavor to make changes in pattern design.

♦ ♦ ♦

OUR British contemporary the *Foundry Trade Journal*, calls attention in one of its recent issues to an important phase which often is overlooked in foundries in this country. It is even more important in Great Britain where the fuel situation is serious. The discussion pertains to improvement in gray iron molding practice whereby the yield in relation to poured weight is increased as high as possible. In one foundry the yield was increased from 54 to 64 per cent with a saving of approximately 900 tons of coke. In another foundry the yield was increased from 50 to 63 per cent. Hence, it might be wise in more ways than one if gray iron foundries in this country would investigate the possibilities of increasing casting yield to the highest possible point.

♦ ♦ ♦

USEFUL kink that may come in handy some time in the magnesium foundry is the use of an asbestos sleeve in the riser of a green sand mold to decrease its cooling rate to some extent, and increase its feeding period. The sleeve is made from 1/32-inch thick asbestos paper, such as used for wrapping hot air pipes, which is rolled up into a cylinder. Precaution must be taken that the paper is thoroughly dried before it is inserted in the riser.

♦ ♦ ♦

A number of interesting features are mentioned in a recent article, which appeared in our overseas contemporary, *Foundry Trade Journal*, and described the production of what is claimed to be the largest magnesium alloy castings in the world. The castings which are highly intricate and form part of the undercarriage of heavy planes weigh about 750 pounds as cast, 250 pounds in the rough, and about 225 pounds after machining. They are u-shape and appear to be about 5 x 3 x 2 feet overall. Each casting is completely radiographed before acceptance. Removal of gates and risers is accomplished with a horizontal bandsaw, and long feeder pads along the sides of the casting are removed with a router using cutters revolving at 18,000 revolutions per minute.

♦ ♦ ♦

BUREAU of Mines, United States Department of the Interior, Washington, recently published a 17-page information circular entitled, "Industrial Insulation With Mineral Products", by Oliver Bowles, which gives considerable information on the characteristics, applications, commercial forms, insulating value, etc. of various materials such as mineral wool, asbestos, basic magnesium carbonate, vermiculite, diatomite, and others. Copies of the circular, which is designated I.C. 7263, may be obtained by writing to the bureau.

♦ ♦ ♦

In an investigation of zinc containing aluminum and copper carried out in Germany, results obtained on casting properties, tensile strength, corrosion resistance, dimensional stability indicate that the composition should be from 1.2 to 1.6 per cent copper, 5.7 to 5.9 per cent aluminum, and remainder zinc. The eutectic structure of the alloy is finer cast in metal molds than in sand.

♦ ♦ ♦

NECESSITY for maintaining close control on silicon, carbon and phosphorus contents is indicated clearly in an article in the *Foundry Trade Journal* discussing the use of high phosphorous pig iron. It states that in the case of irons containing 1.5 per cent silicon, porosity due to shrinkage is likely to occur if the phosphorus exceeds 0.4 per cent and the carbon exceeds 3.5 per cent. With carbon below 3.4 per cent, and the same silicon content, the phosphorus can be raised to 1.2 per cent. When the section of a casting decreases making it necessary to increase the silicon content, a reduction of both carbon and phosphorus content is necessary. Thus, with 2 per cent silicon and carbon exceeding 3.3 per cent, porosity may appear at about 0.3 per cent phosphorus. With total carbon content less than 3.2 per cent, the phosphorus may be increased to 1.2 per cent.

♦ ♦ ♦

NEW permanent magnet alloy containing 12 per cent cobalt, 17 per cent molybdenum and remainder iron has a number of advantages. It contains a minimum of critical materials, can be cast easily, and when properly heat treated can be drilled, milled and machined readily. It has a high coercive force of 245, a high residual induction of 10,300, and a maximum energy value of 1,100,000.

♦ ♦ ♦

WRINKLE to give quick identification as to which shift of coremakers is responsible for defects attributable to cores is being employed in a number of foundries. With two shifts the sand mixture used by one has a dye incorporated so that it has a distinctive color while the other shift uses naturally colored sand in the coreboxes.

♦ ♦ ♦

RESULTS of an investigation carried on in England on the application of a basic lining in the ladle used for desulphurization with sodium carbonate indicate that it has possibilities. Materials used were magnesite, calcined dolomite, and stabilized dolomite. Best results were obtained with tar-bonded dolomite. Results obtained with stabilized dolomite while not as good, were superior to firebrick, loam or other acid lining. Stabilized dolomite has the advantage that it can be kept in stock by the user without deterioration, and can be mixed with water instead of tar.

E. B.

WAX COMPOSITIONS: Interest in the investment process for producing castings to small tolerances in dimension brings up the question of wax compositions for forming the pattern placed in the mold. Those who like to experiment might try some of the following compounds: Ozokerite (a natural fossil wax) 61 per cent by weight, paraffine 29 per cent by weight, and rosin 10 per cent by weight. Another is composed of 70 per cent ceresin (another name for ozokerite) and 30 per cent beeswax. A third is made from 2 parts beeswax and 1 part rosin with a small amount of venice turpentine. Still another is comprised of 1 pound of beeswax, 1 ounce of venice turpentine, and a few drops of glycerine.

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CORRECT FIT IMPORTANT

In Goggles for Foundry Use

(Left)—These goggles are too wide; the eyes do not look through the lens centers. (Right)—Headband should be worn low at back of the neck

By LYNE S. METCALFE

FEW safety measures taken in American foundries generally are considered of greater importance than those which seek to protect the workers' eyes from the numerous hazards present in the course of a day's work. The chief instrumentality in achieving this protection is the safety goggle, and its proper selection and adjustment largely determines its usefulness.

Every foundry foreman has witnessed the result of poorly fitting—and therefore uncomfortable — non-prescription goggles. Being uncomfortable, the worker discards them at every opportunity—which exposes his eyes to the very hazards against which safety goggles are designed to give protection. Improperly fitted goggles, with the resultant discomfort, may result in poor vision which also may mean the worker wears them up over his forehead or hangs them to one side, exposing him to eye injury.

The purpose of non-prescription safety goggles is to protect the eyes of the worker from such hazards as ultra-violet or infra-red rays, flying chips, sand, dust, chemicals, etc. Such protection as safety goggles give tends to reduce absenteeism due to eye disablement.

In order to help foundries provide a correct fit to the safety goggles furnished their employes, a 14-minute, 16-mm., sound motion picture has been produced for the American Optical Co., Southbridge, Mass., by the Jam Handy Organization, titled, "Right on the Nose," and will be loaned free of charge to any foundry or foundry group interested in using it. It was produced primarily for the training of foremen, nurses, safety engineers and other foundry personnel whose responsibility it is to see that workers' safety goggles are properly selected and then properly adjusted. With this film goes a correlated booklet which, with the film, comprises a short, visualized course in the simple techniques of goggle fitting and adjustment. This motion picture is strictly educational in character and contains no advertising.

A few of the more important points brought out in the film are indicated by the accompanying illustrations. The procedures shown by the motion picture are elaborated on and explained by the film sound track.

The following recommendations are made in the use of spectacle type goggles:

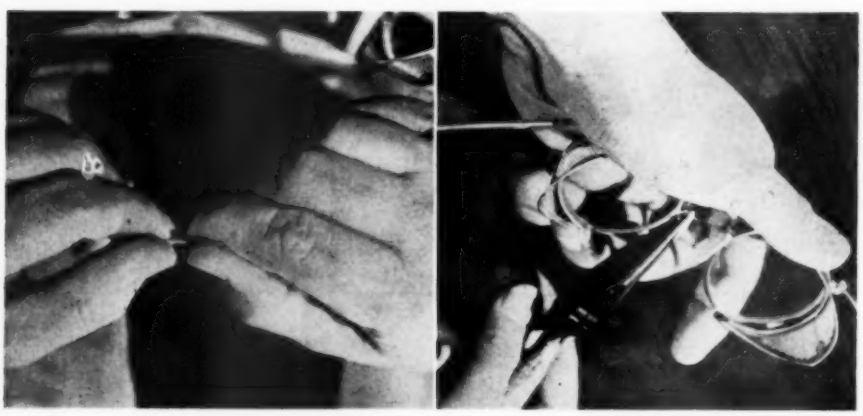
1. Temples or side-bows should be adjusted properly so that the temples fit snugly but comfortably about the ears. When an adjustment is needed, take out the kink by exerting a gentle pressure with the thumb, the fingers acting as a brace. Shape the temple with two fingers, putting the kink where wanted.
2. The bridge should be adjusted properly so that the goggles rest comfortably on the solid bone of the bridge of the nose without pinching. A pair of truing pliers is useful in adjusting the bridge.
3. Goggles should be adjusted so that the eyes of the wearer look directly through the lens centers.
4. Side-shields should be adjusted so that they fit comfortably and give maximum protection.

In using eye-cup type goggles two important points to be remembered are:

1. The ball-chain bridge should be adjusted to the individual wearer so that the eye-cups fit comfortably in the orbits of the eyes, and so that the wearer looks through the lens centers.
2. The head-band should be adjusted so that it holds the goggles snugly but comfortably in place. It should be worn above the ears and low at the back of the neck.

After selecting the proper type and size of goggles for the individual foundry worker and his particular job hazards, the goggles must be fitted to meet the characteristics of the individual's face. Every human being varies to some extent in these characteristics, and this must be considered in order to obtain maximum eye protection with the maximum in wearing comfort. Safety goggles are useless when worn on the worker's forehead or hanging on a nearby hook.

Prints or copies of this film will be loaned by the American Optical Co., Southbridge, Mass.

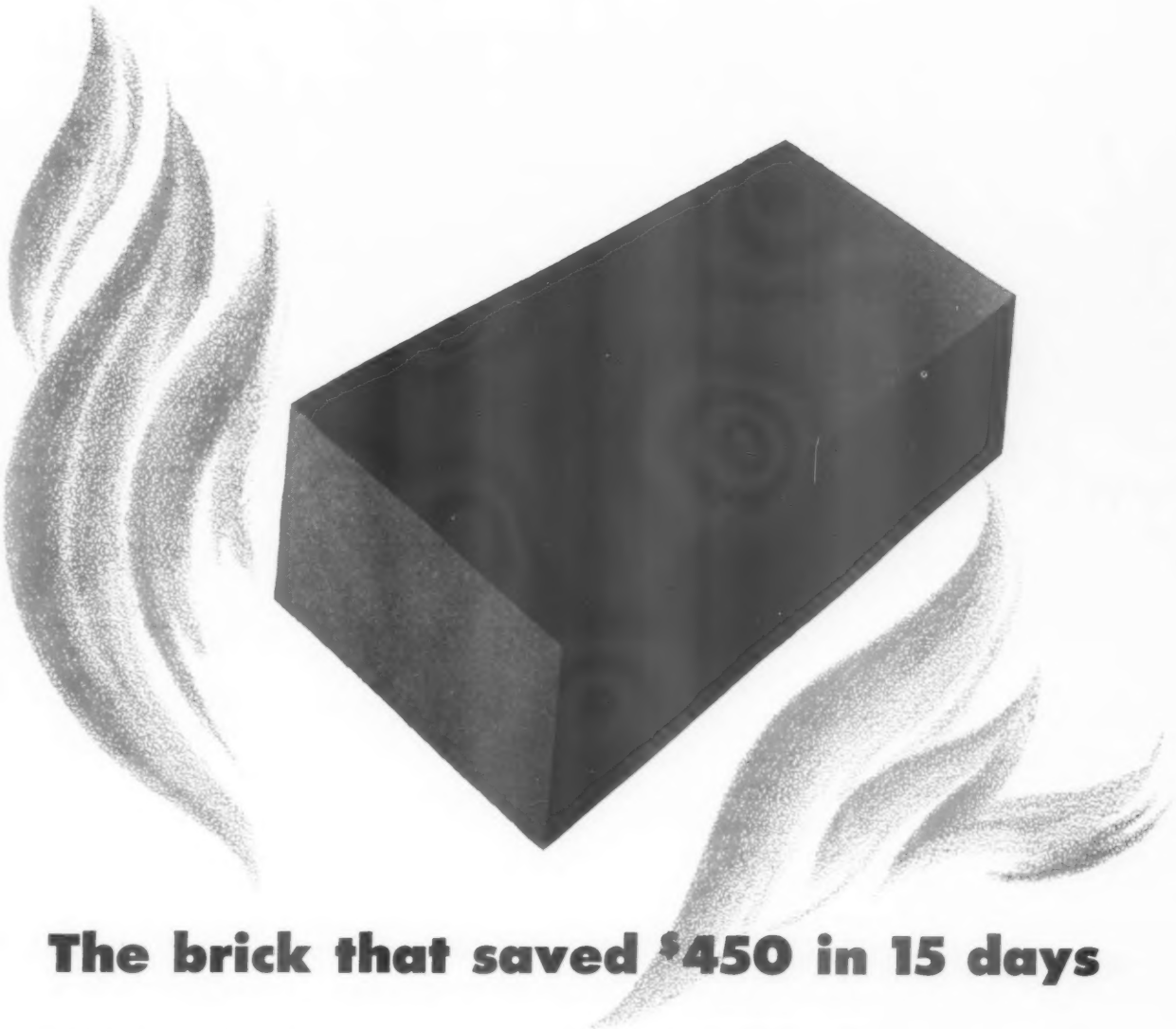


(Left)—Truing pliers aid in adjusting bridge of goggles. (Right)—Shaping the temple to put the kink where wanted is accomplished easily by hand

Book Review

A. S. T. M. Specifications for Steel Piping Materials, paper, 255 pages, 6 x 9 inches, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, price $1.75.

This 1943 compilation contains all A. S. T. M. specifications on steel piping materials, and includes 44 standards and 25 emergency alternate provisions. Many of those are part of the schedule appended to WPB limitation order L-211. Ten of the specifications are on boiler, superheater and miscellaneous tubes; 16 cover various types of pipe; 5 relate to carbon alloy steel castings for valves, flanges and fittings; 4 are on forgings and welded fittings, and 4 are for bolting material including one on heat treated carbon steel. The book also contains an austenite grain size classification chart for steels.



The brick that saved $450 in 15 days

Weighing less than 4 lbs. each, one Mexite Briquette, introduced into the cupola charge provides the same carbon content as 50 lbs. of pig iron.

Because of the present day spread between scrap and pig prices, Mexite Briquettes greatly reduce melting costs per ton. For example, one large foundry, by the use of Mexite Briquettes, cut their charge of pig by 50% and yet maintained a carbon analysis which varied less than 0.15% carbon during a fifteen day test period. As a result of the cheaper scrap charge, $450 was saved.

Mexite Briquettes not only cut costs by replacing pig, they also reduce the range of fluctuation of carbon content and give a steadier carbon analysis. This stabilizing factor is particularly vital when high percentages of steel are charged.

Mexite Briquettes give additional "life" and "freshness" to any heat, and often increase fluidity thus resulting in better castings and less scrap.

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Mexite Briquettes

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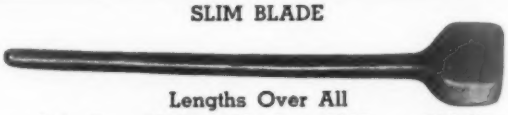
KOOLHEAD FOUNDRY CHILL NAILS
HOT FORGED — COLD FINISHED

GIANT HEAVYWEIGHT HEAD

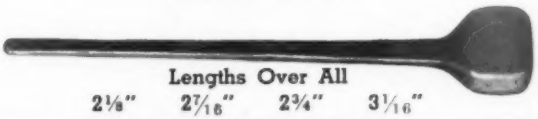
3 1/16" Long

SLIM BLADE



Lengths Over All
1 11/16" 2 1/8" 2 7/16" 2 3/4" 3 1/16"

MEDIUM BLADE



Lengths Over All
2 1/8" 2 7/16" 2 3/4" 3 1/16"

JUMBO PATTERN

3 1/16" Long

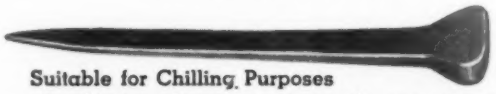
HORSE NAIL BLADE

Lengths Over All
2 1/8" 2 3/8" 2 5/8" 2 7/8"

LOK - SAND
OR "SCAB" NAIL
Straight or Bent
to Any Angle

3 1/16" Long

HORSE NAIL SECONDS



Suitable for Chilling Purposes
But Not For Shoeing — Sizes No. 5 to No. 11

HORSE NAIL STUBS

Made in Lengths
1" 1½" 2"

INDUSTRY ...Briefs

DEFENSE PLANT CORP. has authorized plant expansion and equipment purchases as follows: Howard Foundry Co., Chicago, $90,000 increase in contract for additional equipment at Chicago plant, making overall commitment $2,650,000; Ohio Steel Foundry Co., Lima, O., $90,000 increase for additional facilities at Lima plant, making overall commitment $3,800,000; Precision Castings Co., Syracuse, N. Y., $425,000 for plant facilities at Fayetteville, N. Y.; Michigan Steel Castings Co., $65,000 for additional facilities at Detroit plant; Elmira Foundry Co. Inc., $660,000 for plant facilities at Elmira, N. Y.

• • •

Wilson Foundry & Machine Co., Pontiac, Mich., expects to complete installation of more than $1,000,000 worth of new equipment in its foundry division by July. The equipment will mechanize the foundry and permit doubling its output with approximately the same personnel. One of the foundry's units will be designed for increased output of small castings; a second for large parts, such as cylinder block; another unit will speed the cleaning of castings; and other machinery will mechanize the charging of cupolas. The foundry now has about 800 employes.

• • •

Colonial Foundry Co., Louisville, O., has been awarded the "M" pennant and Victory Fleet flag of the United States Maritime Commission. The company has been making bed plates and column castings for marine engines, and during the two years after July, 1941, increased its production for all classes of work by 350 per cent. At the formal ceremonies the "M" award was made by Charles E. Walsh Jr., director of procurement of the Maritime Commission, to William Love, president, the Colonial Foundry Co.

• • •

Production of malleable castings in January amounted to 75,247 tons, compared with 75,188 tons in December, 63,572 tons in January, 1943, and 69,203 tons two years ago. Orders booked less cancellations totaled 93,261 tons in January against 81,978 in December, 73,524 a year ago and 106,045 two years ago. These figures are based on reports to the Department of Commerce by producers representing about 93 per cent of the industry's output as shown in the 1939 Census of Manufactures.

• • •

Fort Pitt Steel Casting Co., McKeesport, Pa., has been awarded the second gold star to be added to its Maritime Commission "M" pennant. The award recognizes the company's achievement in production of merchant ship components.

• • •

Brass and bronze ingot shipments by members of the Defense Council of the Ingot Brass and Bronze Industry totaled 43,569 tons in January. This compares with 42,032 tons in December, 36,121 tons in January, 1943, and 27,798 tons in January, 1942. Total 1943 shipments of 475,044 tons compare with 384,668 tons in all of 1942.

• • •

Cooper-Bessemer Corp., Mount Vernon, O., and Grove City, Pa., has been awarded the Army-Navy "E". The company's plants also fly the Maritime Commission's "M" pennant to which two gold stars have been added.

• • •

Frank Foundries Corp., Moline, Ill., has been authorized by the Defense Plant Corp. to provide facilities at a plant in Muncie, Ind., at a cost in excess of $95,000.

• • •

National Bronze & Aluminum Foundry Co. will build and operate a new $1,900,000 plant in Cleveland, it has been announced by the Defense Plant Corp.

• • •

Jenkins Bros. raised two new flags over its Bridgeport, Conn., plant on March 4, each bearing an additional star. One was the Maritime Commission "M" pennant showing three production awards, and the other was the Army-Navy "E" flag representing the fourth citation.

• • •

Centrifugal Casting Co. is the firm name under which Leo J. Le Fave has published a certificate that he is conducting business at 111 Granada Avenue, El Monte, Calif.

• • •

Pittsburgh Equitable Meter Co.—Merco Nordstrom Valve Co. have opened a new office in Atlanta, Ga., with C. C. Moore, formerly in charge of the Memphis office, as district manager. The Memphis office has been closed.

• • •

Office of Civilian Defense has granted its National Security Award to the Lebanon Steel Foundry, Lebanon, Pa., and the Pangborn Corp., Hagerstown, Md. The award recognizes superior achievement in plant security organization.

• • •

Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has been awarded a second gold star to be added to its Maritime "M" pennant for continued excellence in the production of cast and forged steel valves.

• • •

Kelley-Koett Mfg. Co., Covington, Ky., is occupying a new one-story plant addition completed recently to handle its expanded production of x-ray equipment and other war products.

• • •

Atlas Brass Foundry Inc., Los Angeles, is building an addition to its plant to cost $6000.

• • •

S & S Grey Iron Foundry, Marion, Ind., was destroyed recently by fire.

NATIONAL SECURITY AWARD: Thomas W. Pangborn, president, the Pangborn Corp., Hagerstown, Md., receives the National Security Award certificate from Col. Henry A. Reninger, acting regional director, Third Civilian Defense Region, Office of Civilian Defense, as Col. Henry Barrett, commander, Civilian Corps, Maryland Council of Defense, watches presentation. The OCD award recognizes superiority in industrial programs for plant and personnel security

Osborn Head Lauds Army, Navy Engineering

Franklin G. Smith, president, the Osborn Mfg. Co., Cleveland, in accepting the Army-Navy "E" awarded the company recently, paid tribute to engineers of the Army and Navy for the high standard achieved in our fighting equipment. Shown in the front row at the pennant presentation ceremony, left to right, are: Maj. Gen. James L. Collins, commanding general, 5th Service Command, who presented the award; Charles K. Arter, master of ceremonies; and Comm. William P. Bacon, senior assistant to the Inspector of Naval Material, Cleveland, who presented the employe "E" pins. Fred Kischel, chairman of the union committee, accepted the emblems for the employes

Provides Optional Test Bars

Study and discussion in Committee B-5 on Copper and Copper Alloys, Cast and Wrought of the American Society for Testing Materials has led to the approval of emergency alternate provisions in eight brass and bronze casting standards which provide the option of casting coupons in accordance with certain dimensions and practices. The alternates issued Dec. 27 supersede those previously issued except in the case of EA-B61, and include EA-B60a; EA-B62a; EA-B143a; EA-B144a; EA-B145a, and EA-B146a.

Information given by A.S.T.M. states that the following Emergency Alternate Provision, when specified, may be used as an alternate in the following specifications and affect only the requirements referred to:

Castings of the Alloy: Copper 88 per cent, Tin 8 per cent, Zinc 4 per cent (B60-41).

Steam or Valve Bronze Castings (B61-42).

Composition Brass or Ounce Metal Castings (B62-41).

Tin-Bronze and Leaded Tin-Bronze Sand Castings (B143-42T).

High-Leaded Tin-Bronze Sand Castings (B144-42T).

Leaded Red Brass and Leaded Semi Red Brass Sand Castings (B145-42T).

Leaded Yellow Brass Sand Castings for General Purposes (B146-42T).

Section 7 in EA-B60a, EA-B61, and EA-B62a and Section 9 in EA-B143a, EA-B144a, EA-B145a, and EA-B146a.

Section 7 or 9—Change this section which describes the test specimens to read as follows:

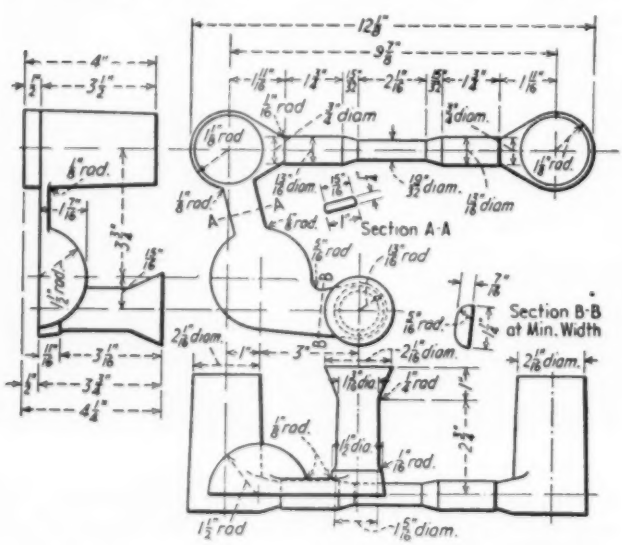
7. (a) The manufacturer shall have the option of casting test coupons according to Figs. 1, 3, or 4. Because of the web between riser and casting, it is necessary that the gage length of the test specimen prepared from Fig. 1 be machined to the size shown in Fig. 2 before testing.*

(b) In the case of test specimens prepared from the coupons shown in Figs. 3 or 4, the manufacturer shall have the option of testing the specimen without machining the gage length, or the coupons may be machined to the dimensions shown in Fig. 2. Thus the coupons shown in Figs. 3 or 4 shall be mandatory when the test specimens are tested without machining the gage length. Machined to size test specimens may be prepared to the dimensions of Fig. 2 from the coupons shown in Figs. 1, 3, or 4.

Figs. 3 and 4—Add the accompanying Figs. 3 and 4 showing the optional coupons for as-cast tension test specimens.

Note.—For further information and data, reference may be made to "Studies of Machined versus As-Cast Test Specimens for Copper-Base Alloy Sand Castings," Reports to Subcommittee X on Copper-Base Alloys for Sand Castings by J. J. Curran, J. W. Bolton, F. L. Wolf, and W. E. Martin, Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought, Appendix, Proceedings, Am. Soc. Testing Mats., Vol. 42, p. 199 (1942.)

* Figs. 1 and 2 are given in the respective specifications.



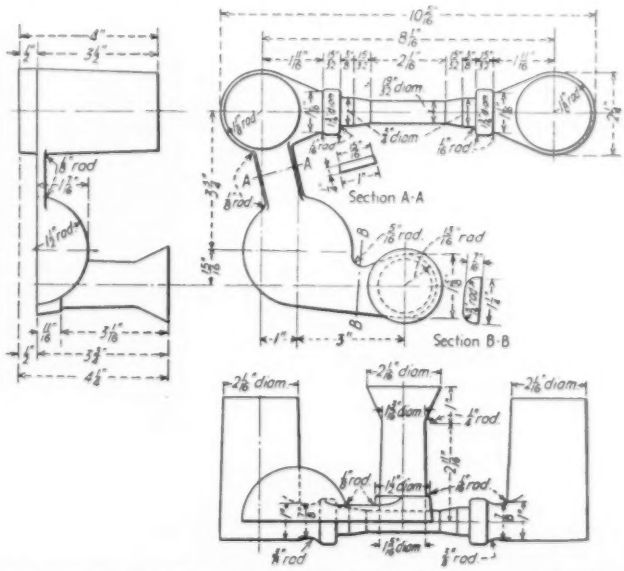
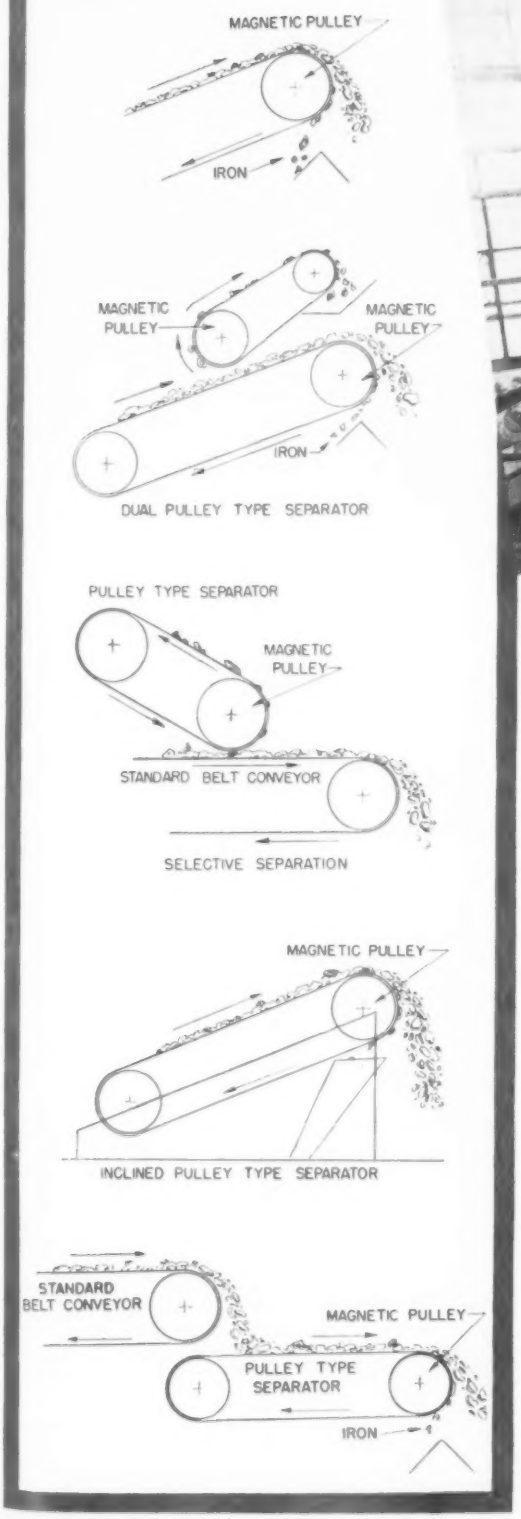


Fig. 3 (Left)—Optional coupon for as-cast tension test specimen, button head. Fig. 4 (Right)—Optional for as-cast tension test specimen, friction grips

DINGS MAGNETIC PULLEYS

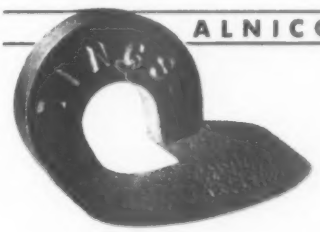


. . . offer broad application possibilities in the metal working industries

● The diagrams at the left represent typical installations of Dings High Intensity Magnetic Pulleys for automatically removing iron from foundry sand, slag, non-ferrous scrap and other substances. No matter what your requirements or existing materials handling system, Dings engineers can help you adapt a pulley or other Dings Separator to the job.

Write for details and ask for Pulley Catalog No. 250

ALNICO TEST MAGNET



NEW! Alnico horseshoe magnet for laboratories, smelters, refiners, etc. Measurers 2½" high x 3" wide. Pole bases ¾" x ¾". Very powerful. Prices on request.

Dings MAGNETIC SEPARATION HIGH INTENSITY

World's Largest Exclusive Builders of Magnetic Equipment

DINGS MAGNETIC SEPARATOR CO.

512 E. Smith St. ● Milwaukee 7, Wisconsin

READERS' COMMENT • • •

Tools Tear 'Em Up

To the Editors:

Some time ago we asked your advice on high tin bronze bushings rejected because they did not finish up smooth enough in the machine shop. We had a rather peculiar experience with this composition *H*, that is U.S. Navy specification 46-B-9-c. We have been making the same bushings for stern post bearings for two different naval districts. In one district they are accepted practically 100 per cent. In another district they have been rejected practically 100 per cent. We maintained that the defect upon which one naval inspector bases his rejections is due entirely to the method of machining. Your diagnosis, pointing out that the job should be done with a very fine diamond pointed tool, confirmed our opinion. Yesterday we had representatives here from both naval districts and now we are glad to say that both districts are in agreement and are accepting the castings.

A Bronze Foundryman

Alloys Available

To the Editors:

Restrictions on nickel, the first of the important alloying elements to go on allocation, have been eased. Effective Feb. 1, those companies whose purchases of nickel in the six preceding months have not exceeded an average of 25,000 pounds monthly, have been relieved of the necessity of having to file Form WPB-2871 (old PD-27) for their requirements with the Nickel Branch of the Ferro-Alloys Division, for an allocation. The ban on the use of nickel in gray iron machine tool castings, which has been in effect since early 1942, regardless of preference ratings, has been lifted. It is now permissible to use nickel in this class of castings on orders carrying a preference rating of AA-3 or better, the same limitation which applies to the melting of nickel for all other products.

This easing of the situation in nickel, along with the fact that it is no longer necessary to file forms with the WPB to obtain high carbon ferro-chrome, ferro-molybdenum and ferro-vanadium, would seem to indicate that supply and demand are pretty well equalized. The melting restriction on chromium remains subject to a preference rating of AA-5 or better. There is no rating limitation on either molybdenum or vanadium.

Control of the nickel and ferro-alloy situation remains in the hands of the WPB through form WPB-1770 (old PD-707) titled "Ferro-Alloys—Detailed Request for Permission to Use." This form was revised on Feb. 10, 1944 and now incorporates in the instructions to be followed in its preparation, the following:

"Each producer of alloy iron or alloy steel castings must file for each month with the War Production Board, Ref. M-21-a, a melting schedule on Form WPB-1770, for each plant which melts in such month over 400 tons of alloy steel, or over 150 tons of alloy iron, or over 25 tons of high alloy containing 5 per cent or more of nickel or chromium or 2 per cent or more of molybdenum. If a plant melts more than one category and is required to file WPB-1770, all categories should be included.

"This schedule deals with the alloying metals, nickel, chromium, or columbium, molybdenum, tungsten, vanadium and cobalt which you expect to melt during the month of report (i.e., the month following the current month) in order to meet the delivery dates required by your customers.

"This report must be filed with the Ferro-Alloys Branch, War Production Board, Washington 25, D. C., not later than the 15th of the month preceding the month of report for which request for allocation is made."

In filling out form WPB-1770, it should be noted that it is not necessary to fill in column "M" if your monthly nickel consumption is less than 25,000 pounds, nor column "N" if your contained chromium consumption is less than 3000 pounds monthly.

Definitions of an alloy iron and alloy steel in connection with form WPB-1770 as well as instructions as to who should file this form for cast products, and form WPB-2933 for rolled and forged products are contained in supplementary Order M-21-a, "Alloy Iron and Alloy Steel," as amended Jan. 21, 1944. These definitions read:

"(1) "Alloy steel" means any steel containing any one or more of the following elements in the following amounts:

"Manganese, maximum of range in excess of 1.65 per cent. Silicon, maximum of range in excess of 0.60 per cent. Copper, maximum of range in excess of 0.60 per cent. Aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying element in any amount specified or known to have been added to obtain a desired alloying effect.

"(2) "Alloy iron" means any iron containing any one or more of the following elements in the following amounts:

"Manganese, maximum of range in excess of 1.65 per cent. Silicon, maximum of range in excess of 5.00 per cent. Copper, maximum of range in excess of 0.60 per cent. Aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying element in any amount specified or known to have been added to obtain a desired alloying effect."

A. C. Meyers

Williams & Co. Inc.,
Pittsburgh

"Drop the Bottom on Tokyo"

To The Editor:

The annual convention to be held in Buffalo will be the first one I've missed in many a year. I had counted on being there but guess I'll just have to pass it up. We gunnery officers are fairly lucky in that we will only have to serve one year's duty out here. As a rule, after that period, we are sent back to the mainland. However, one cannot tell what lies ahead.

I would like you to say "Aloha" to any of my friends who may ask for me at the convention. I wish I could tell you of some of the things we see out here but censor prohibits it. It's a wonderfully active point and is truly "The Springboard". Let us hope it won't take too many dives to the day we "Drop the Bottom on Tokio!"

Lieut. (jg) J. R. Wark

Navy 14—AFGU
c/o Fleet Post Office
San Francisco, Calif.

Editor's Note: Before his enlistment in the Navy, Jack was associated with the Queen City Sand & Supply Co., Buffalo, and was secretary of the Western New York Chapter of the A.F.A.

Is This a Record?

To The Editors:

We have operated a small gray iron foundry for the past 35 years in the southern Illinois oil fields. During the past 2 or 3 years we have been engaged exclusively on war work. In 1943 with a *total* of 30 employes we turned out 2783 tons of castings. This is a record production for our shop. So far as we can find out it is a record for this entire district. Working 6 days per week, a total of 308 days, it means 12.28 tons per day, or 818 pounds per man per day. We shall be interested in learning how this production compares with that of other gray iron foundries.

Edgar A. Rowe

Martinsville, Ill.

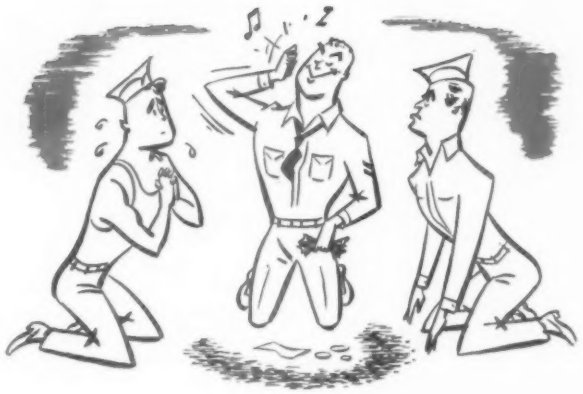
Political Issue

To The Editors:

Your editorial in the March issue asking the Government to provide a realistic approach to foundry manpower problems will appeal to every foundry operator, and even more forcefully to large foundry customers. There is no question that most foundries have done a magnificent job under severe handicaps and there will never be a realistic approach to foundry problems until they are placed in the hands of foundrymen or foundry customers of experience.

It is well nigh impossible to convince Government authorities that the present

(*Continued on page* 194)



Penolyn Core Oil means RAPID CLEANOUT...

There's little lost motion

when Penolyn Core Oil is on the job, because Penolyn means quick cleaning of castings—no hardened lumps to dig out. It's saving important minutes in war-production foundries all over America—helping them to do the tremendous job they're doing for Victory.

Penolyn Core Oil bakes fast, too . . . binds hard . . . holds gas-forming tendencies at rock-bottom . . . cuts rejects due to imperfect cores. Penola engineers are always on call.

WE'D LIKE TO MEET YOU! Drop in at the Penolyn Core Oil booth while you're at the 3rd War Production Foundry Congress and Foundry Show in Buffalo. You'll be heartily welcomed—and find your visit worth while!

PITTSBURGH, PA.

Penola
Reg. U.S. Pat. Off.

NEW YORK
CHICAGO
DETROIT
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40 years of valuable experience can mean the difference between success and failure when it comes to solving the intricate problems of Industrial Dust Control.

Pangborn Corporation has that 40 years of valuable experience and offers its benefits to you for application to *your* problems,—no matter how large or small.

The two installations pictured above show the flexibility of our Dust Control program. The large one is a giant "CH" Collector, doing an efficient, economical job and occupying a minimum of space. In the insert is our new "CK" Unit Collector which was specifically designed to handle small air volume dust requirements of industrial operations. Into both of these collectors have gone the research and knowledge of our 40 years experience.

During these hard-hitting, war production times, the value of Dust Control has been forcibly brought home to a great many alert industrialists. They are thinking in terms of tomorrow as well as today and realize the position of responsibility which Dust Control will occupy on the mammoth production lines of the future.

Come to Pangborn with your dust problems, for today or tomorrow, and receive—as an extra dividend—the benefit of our *40 Years of Valuable Experience.*

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

(*Continued from page* 192)

high production of airplanes is not justified because of the shortage of steel castings. They understand that airplanes can not fly and fight efficiently without high octane gasoline, and they know that new refineries must be built to produce this high octane gasoline, which has the highest priority rating. Nevertheless, the steel castings required in refineries for valves, instrument controls and pressure equipment are the bottleneck, and the primary cause of that bottleneck is the manpower problem.

When wages were frozen some unions had just received increases while others were about to receive them and the complete change in industrial labor requirements presented a problem which could only be settled under the operation of the law of supply and demand or the freezing of jobs. Foundry labor found itself frozen with wages 20 to 40 cents lower than offered similar labor in shipyards and airplane factories. In an attempt to increase these wages, they ran into the obstacle which is very well described by Robert J. Watt, International Representative of the A. F. of L., who stated:

> "Under the present strange legal requirements, a wage agreement agreed to by men and management, considered by a tripartite panel, passed upon and probably changed by the Regional or National War Labor Board, can be vetoed by a one-man boss, who makes the rules, changes them if he wishes, and then acts as both judge and jury on a case upon which he did not hear the facts."

That boss is that now familiar devil, the dictatorial bureaucrat.

To further complicate the situation our manufacturers of vital refinery equipment must buy castings under ceiling prices which, in many cases, are lower than the ceiling prices of comparable castings ordered by war agencies. The harassed foundryman is forced to run the higher priced castings to operate at a profit and so the necessary refinery equipment is set aside unless it is given a higher priority, which is seldom done. Unfortunately the government agencies have tried to increase the supply of castings by supplying new foundries, new facilities and additions to existing facilities, which waste the taxpayer's money and absorb more of the limited manpower while the output of the foundries is steadily declining. One plant which turned out its maximum capacity of 800 tons of castings in November, 1942, now has a maximum capacity of 2500 tons but is producing less than 800 tons per month because there is a shortage of manpower. Woe to foundry management and labor when these new facilities go into cut-throat competition, or operate at fractions of their capacity after the war!

Both Germany and Great Britain have avoided these wastes of tax money and manpower simply because their industrial production is supervised by industrial experts drafted into the government service. We have some very excellent Army and Navy personnel who had

(*Concluded on page* 196)

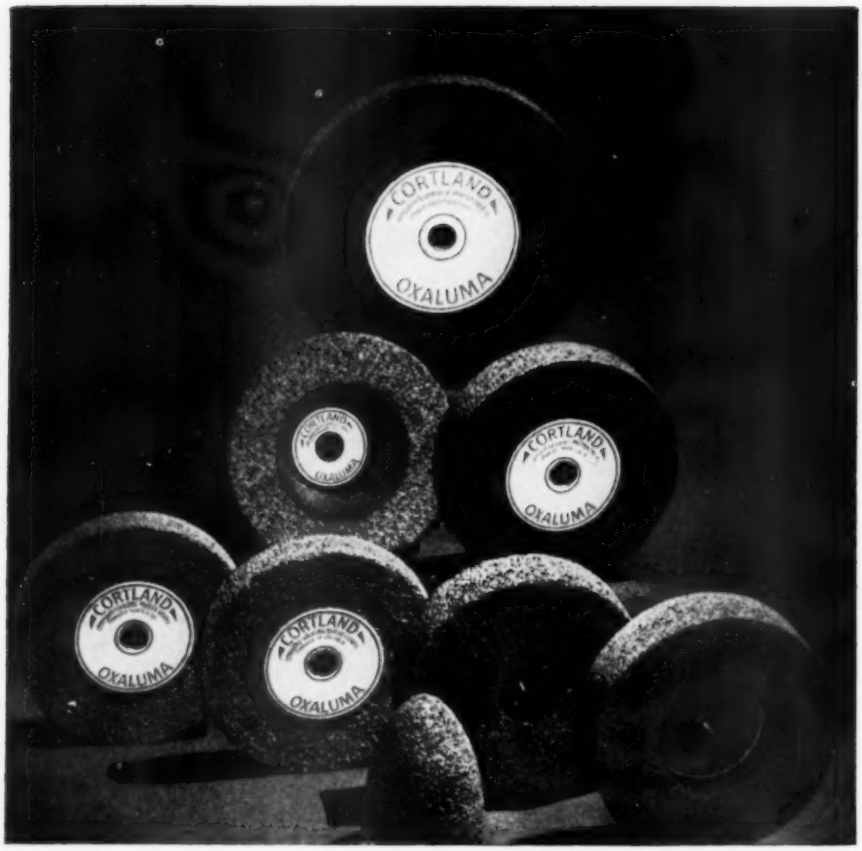
THIS Logan Conveyor System, in a large midwestern foundry, is typical of Logan equipment in use in both large and small foundries throughout the nation. The engineering "Know-how" needed to plan production flow and to get the greatest value and help out of a conveyor system is a Logan plus which costs you nothing. May we consult with you on your *production flow* problems? Meanwhile write for Foundry Conveyor Catalog 15. You will find it full of helpful suggestions based upon the experience of foundries who are using Logan equipment to speed operations. Write Logan Co., Inc., 580 Cabel St., Louisville, Ky.

AN EXAMPLE OF LOGAN FLOW

From molding machines at left molds are stored and then poured on the transverse Roller Conveyor lines. The main Roller Conveyor line at right, consists principally of a series of turn tables to facilitate transfer from the pouring lines after cooling. This conveyor leads to shake-out position at rear where another conveyor (not shown here) returns the empty flasks to the molding machines.

PUT FLOW INTO PRODUCTION WITH

Logan Conveyors



Rapid Stock Removal

Long Life . . .

. . . a winning combination you'll always find in Cortland Grinding Wheels. Made in all types and sizes for operation on portable grinders, floor stands, and swing frames: Vitrified bonded for 6,500 SFM and under; Resinoid bonded for high speeds up to 9,500 SFM.

Cortland has long specialized in snagging wheels and offers experienced engineering service. Modern production facilities and stocks promote better delivery.

Send in your inquiries to 6 Cortland Street, Chester, Mass.

For Better Snagging

CORTLAND

CORTLAND GRINDING WHEELS CORP. • CHESTER, MASSACHUSETTS

(*Concluded from page* 194)

some experience with industrial problems, but most of these problems are now handled by politicians, lawyers, brokers, professors and others who are utterly unsuited by education, experience, judgement or temperament to handle these problems. Our political leaders are howling for more taxes without admitting that the only remaining large source is the workman's wages. It is amazing that the terrific waste of tax money and manpower has not become the greatest political issue of the day.

WILLARD F. ROCKWELL,
President.
Merco Nordstrom Valve Co., Pittsburgh

Cast Iron Is Topic Of Howe Lecture

With an attendance of nearly 3000 the 160th meeting of the American Institute of Mining and Metallurgical Engineers held at the Waldorf Astoria, New York, on Feb. 20 to 24 comprised 58 sessions at which 240 papers were presented. Features of the meeting included a forum on postwar control of metallic minerals and metals, a joint session on continuous casting of metals and alloys, a conference on powder metallurgy, a discussion of magnesium production, and presentation of the annual Howe lecture by James T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., on "Cast Iron—Steel Plus Graphite."

J. T. MacKENZIE

Chester A. Fulton, Southern Phosphate Corp., Baltimore, was elected president for 1944, and John L. Christie, Handy & Harmon Co., Bridgeport, Conn., and J. R. VanPelt Jr., Museum of Science and Industry, Chicago, were elected vice presidents. New directors include Milton H. Fies, DeBardeleben Coal Co. Inc., Birmingham, Ala.; J. C. Kennear, Kennecott Copper Co., McGill, Nev.; W. E. Pratt, Standard Oil Co. of New Jersey, New York; J. R. Suman, Humble Oil & Refining Co., Houston, Tex.; R. W. Thomas, New Consolidated Copper Corp., Ray, Ariz.; and Andrew

(*Concluded on page* 198)

Convenience and speed of specimen preparation in the METALLURGICAL LABORATORY

For extra fine polishing, AB Metpolish No. 3 or Alumina No. 3 on AB Miracloth. No. 1505-2F low speed polishing unit.

Second stage of finishing and in many cases the final stage, polishing with AB Metpolish No. 1 or Alumina No. 1 on AB Selvyt Cloth. No. 1500-F polishing unit.

Fountains for washing samples during and between polishing.

First stage of finishing specimens is fine grinding with 600 mesh alundum polishing compound on AB Billiard Cloth. No. 1500-F polishing unit.

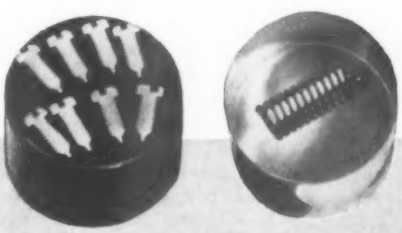
Buehler

MULTIPLE UNIT POLISHING TABLE

The BUEHLER line of specimen preparation equipment includes —

Cut-off Machines • Specimen Mount Presses • Power Grinders • Emery Paper Grinders • Hand Grinders • Belt Surfacers • Polishers • Polishing Cloths • Polishing Abrasives.

The No. 1540 AB Metallographic Polishing Table with units for three stage polishing is a most convenient piece of laboratory equipment for speedily handling the polishing of specimens. One operator can finish many more specimens in a working day than with a single polishing unit.



Buehler Ltd.
A PARTNERSHIP

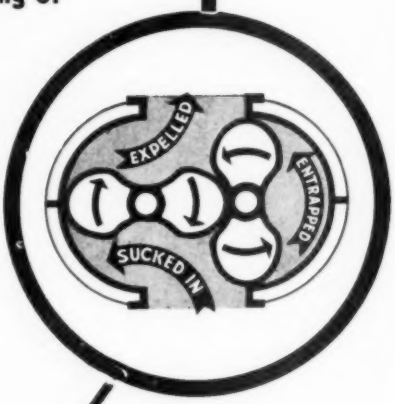
METALLURGICAL APPARATUS

165 West Wacker Drive, Chicago 1, Illinois

POSITIVE AIR PRESSURE
assures faster, uniform melting

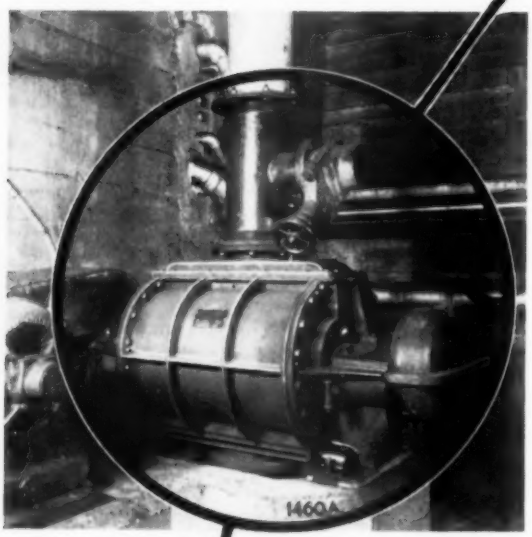
Roots-Connersville Positive Displacement Blowers automatically deliver air to the cupola at a *constant rate* REGARDLESS of varying pressure conditions in the cupola. It is thus possible with "R-C" Cupola Blowers to maintain the coke bed at the correct (hottest) height through the entire heat. The result is more uniform melting of the metal charge.

Furthermore, the consistent record of "R-C" Positive Displacement Blowers for low power consumption and extra-long life assures you the most *economical* air supply possible to obtain. Write for Bulletin.



ROOTS-CONNERSVILLE BLOWER CORP.

404 Madison Ave. • Connersville, Ind.



POSITIVE DISPLACEMENT

The principle is simple and effective. Twin impellers are rotated in opposite directions by a pair of gears. Each impeller alternately sucks in, momentarily entraps, and then expels a definitely measured amount of air, resulting in the delivery of four equal pre-determined volumes each revolution of the drive shaft. Impellers need no seal or lubrication. Capacity varies with speed. Pressure is automatically built up to overcome resistance to air flow.

Photo shows "R-C" Blower supplying air blast to cupola, capacity 1950 c.f.m., 375 r.p.m., 2.2 lbs. pressure. V-Belt drive from motor.

BONDS BOUGHT TODAY

Help Win Beachheads Tomorrow

Roots CONNERSVILLE SINCE 1854

Positive Displacement

CUPOLA BLOWERS

(*Concluded from page* 196)

Fletcher, St. Joseph Lead Co., St. Joseph, Mo.

William A. Haven, Arthur G. McKee & Co., Cleveland, was elected chairman of the Iron and Steel Division of the institute, and Arthur Phillips, Yale University, New Haven, Conn., was elected chairman of the Institute of Metals Division.

Dr. MacKenzie in his lecture pointed out that Professor Howe was one of the first to draw the concept of gray cast iron being a steel matrix whose continuity is broken up by masses of graphite, and then proceeded to discuss the mechanical properties of cast iron and their relationship to that concept. Presence of graphite does not result in a porous material, as believed by some, since it is in the form of whorls which are not connected, and as long as the iron is thicker than the greatest dimension of the graphite, it is not permeable.

Ability of gray iron to take sharp impressions is due to its fluidity, and not to expansion resulting on formation of graphite. Due to the presence of the latter, gray cast iron is not homogeneous, and hence its bending strength cannot be determined from the standard beam formula, due to shifting of the neutral axis.

Graphite Is Useful

Graphite performs a number of useful functions which are difficult to enumerate. Gray iron is the easiest ferrous metal to machine at any given hardness level due to chip brittleness resulting from, and lubricating quality of, graphite. It also acts as a cushion against thermal shock and prevents crazing which is the reason why gray iron is used so successfully on a large scale for brake shoes and brake drum linings. Lack of galling tendency, combined with oil retaining ability and actual lubricating action of graphite is probably responsible for excellent wearing properties of gray iron. Those properties, and not cheapness, are reasons why the automotive industry is a large user of gray cast iron.

Gray cast iron is relatively insensible to notch sensitivity since in effect it contains numerous voids resulting from the presence of graphite, and the cushioning effect of graphite is responsible entirely for the high damping capacity of gray cast iron. Hence, in many cases a softer iron, that is one with more graphite, will withstand vibratory stresses better than a stronger iron.

At the forum on postwar control of metallic minerals and metals, the general consensus was approval of such control, but considerable difference of opinion was expressed on scope and nature of control. Session on continuous casting provided detailed information on several processes for producing ferrous and nonferrous bars and billets directly from the molten metal without rolling. Magnesium production meeting was devoted to descriptions of the several procedures employed in winning magnesium from dolomite.

SECONDARY ALUMINUM
IS DOING A PRIMARY WAR JOB

Radial Aircraft Engine Parts
Tank Diesel Engine Parts
Fuses and Ammunition
Fire Control
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Brake Housings
Brake Shoes
Cowl Rings
Drive Cases on Tanks
Transmission Cases on Tanks
Range Correction Board
Seacoast Computer
Oil Gear Unit Box, 40 mm Gun
Pistons
Booster Pump Assemblies
Upper and Lower Gun Turrets on Aircraft
Aircraft Lights and Fixtures
Gun Synchronizer Parts
Lamp Assemblies
Telescope Parts
Hand Tachometer for Measuring Speed of Propellers
Airborne Radio Gear Housing Assembly
Electric Cable Connectors

This partial list of wartime uses of secondary aluminum may suggest its adaptability to your own product

THE UGLY DUCKLING HAS BECOME A SWAN!

Let's eliminate the old idea about so-called "secondary" aluminum. Don't forget that the entire steel industry is based on the use of scrap . . . yet no one refers to steel as "primary" or "secondary." The same is true of ingot brass and bronze. The source of raw materials need not be a reflection of the quality of the finished product—particularly when all industry is observing W.P.B.'s program of scrap segregation.

Today, thanks to that careful segregation (an advance that will not be lost when the war is over) and thanks to advances in technical knowledge and metallurgical processes, the secondary smelter is producing products of superb quality.

Consulting service on aluminum and other non-ferrous alloys available through your nearest Federated office.

FMD

Federated

METALS DIVISION

AMERICAN SMELTING and REFINING COMPANY

120 BROADWAY, NEW YORK (5) N. Y.

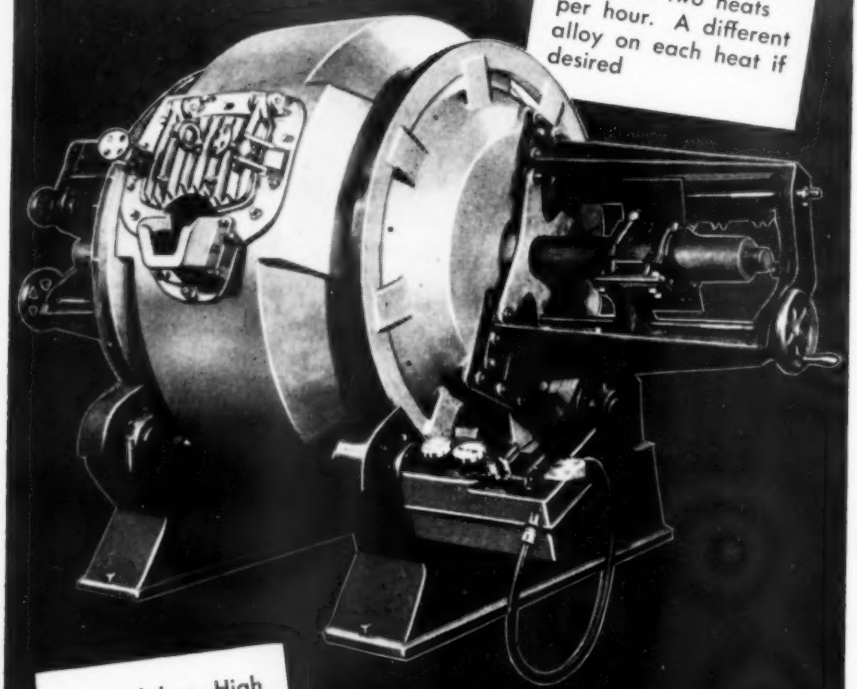
Nation-wide service with offices in principal cities

There are many advantages to a Detroit Rocking Electric Furnace

• Tested and Proven—For 25 years—Over a thousand installations operating throughout the world.

Versatile—In highly successful use for most commercial alloys—ferrous and non-ferrous.

Fast, flexible, efficient—One to two heats per hour. A different alloy on each heat if desired



Saves labor—High rate of production per man hour

Saves fuel—No fuel to handle or store Highly economical in the use of electric energy

Saves metal—Lowest metal losses in melting. Utilizes salvage materials direct in foundry charges

For all around economy and better quality you can't beat a Detroit Rocking Electric furnace. Available in a variety of capacities from 10 to 8,000 lbs. Write us today for further facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

Industrial Health To Be Studied

The second war conference of industrial physicians, industrial hygienists and industrial nurses will be held at the Hotel Jefferson, St. Louis, May 8-14, 1944. The participating organizations are the American Association of Industrial Physicians and Surgeons, American Industrial Hygiene Association, National Conference of Governmental Industrial Hygienists and American Association of Industrial Nurses.

Medical subjects to be presented include welding, in relation to clinical aspects and control of hazards; noise, as to medical phases and means of prevention; better health in small plants; the industrial physician's opportunity to advance medical knowledge; maladjustment and job environment; women in industry; panel discussions on "Who Can Work?" and other timely questions.

The industrial hygienists will examine the health hazards presented by the new synthetic rubber industry; radium; solvents; the toxicology of TNT; the possibilities of an excessive silica dust hazard from the extensive quartz crystal industry; techniques of air sampling in specific reference to the collection of cutting oil mists and of lead fumes.

Foundry Equipment Orders Compiled

Trend of orders for foundry equipment, which rose from approximately $2,000,000 per month in September to $3,500,000 in October as a result, mainly, of the accelerated truck program, has continued at this higher level, according to a recent report of the Tools Division, War Production Board. Shipments have been running level with orders received so that the backlog, which is slightly in excess of two months' current production, has remained level or risen slightly during the last quarter of 1943.

Level of unfilled orders for metal melting furnaces remained fairly stable throughout 1943. Due to the importance of foreign requirements in this field the trend of new orders fluctuates sharply. As of the end of December, 1943, the backlog of unfilled orders represented approximately ten months' production.

Releases of monthly shipments and orders figures on foundry equipment and electric metal melting furnaces are in line with the new War Production Board policy of wider dissemination of data which industry can use in business analysis and business planning, now that the production effort has progressed to a point where such data can no longer give any aid to the enemy.

Foundry equipment includes annealing ovens (malleable castings); blast cleaning equipment, sand or metal abrasive; briquetting equipment for iron and steel borings and turnings; coremaking and

(*Concluded on page* 204)

UNITED

AQUA-SET

A SYNTHETIC CORE BINDER

DRYING TIME IS BAKING TIME

AQUA-SET is a new core binder that sets up FAST in the oven. Just enough heat to dry the cores completes the bake, except for a few minutes to cure the bond. This action sets up a firm, hard top condition with a softly knit center, favorable to a fast collapse on pouring, and the hard core surface assures a more smooth finish on the casting. These qualities give AQUA-SET special value for aluminum and magnesium and the hard surface is especially beneficial in all ferrous casting. AQUA-SET comes in either liquid or dry, powdered form.

Write for complete information.

United OIL MFG. CO.

1429 WALNUT ST., ERIE, PA.

ROTO CLONE

ANOTHER AAF PRODUCT

Solves all fo

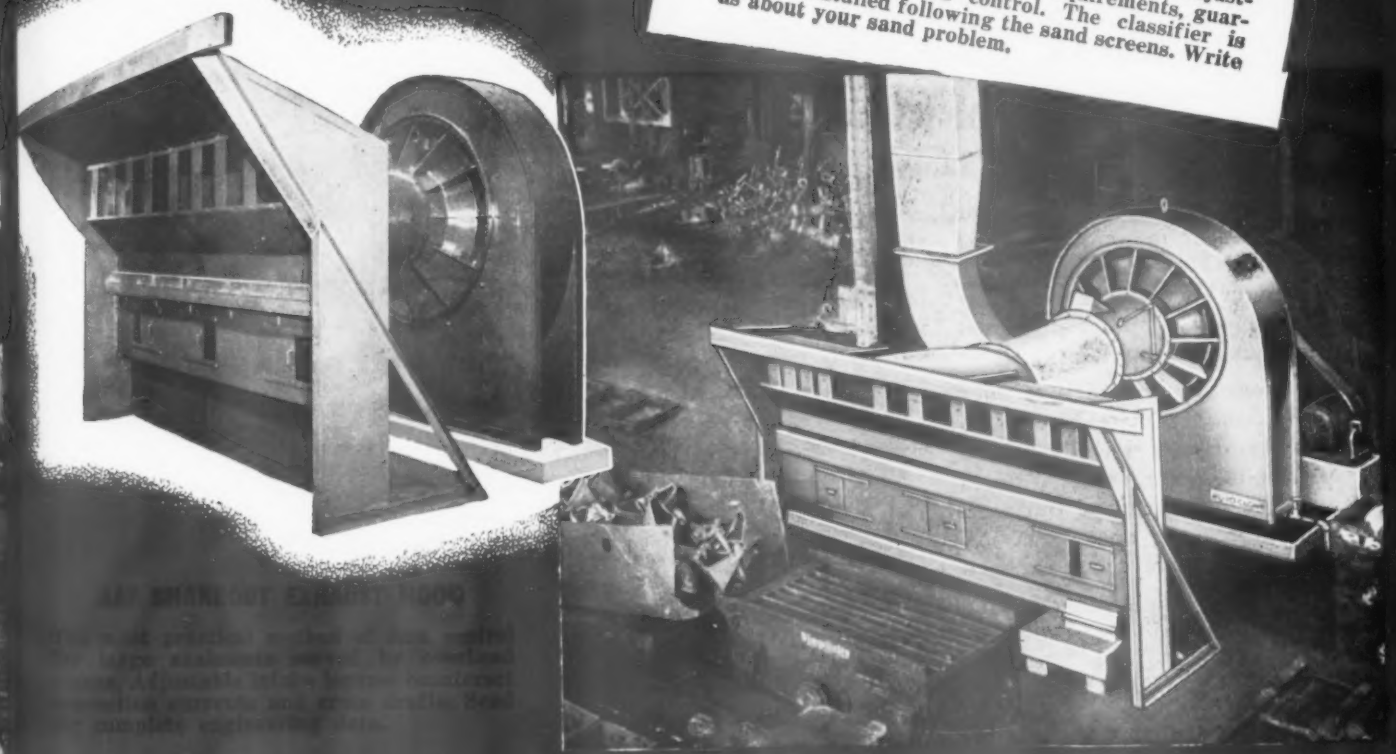
COLLECTING SWING FRAME GRINDER DUST is no problem with Roto-Clone on the job. All dust is confined within booths and the finest particles collected by the Type D Roto-Clone combined separator and dust collector, thus preventing fouling of grinder dust to the work from. Shown on this page are two typical Roto-Clone arrangements illustrating two types of booth enclosures for swing frame grinders. Complete engineering data describing the use of the Type D Roto-Clone for other foundry applications is available on request.

ROTO-CLONE

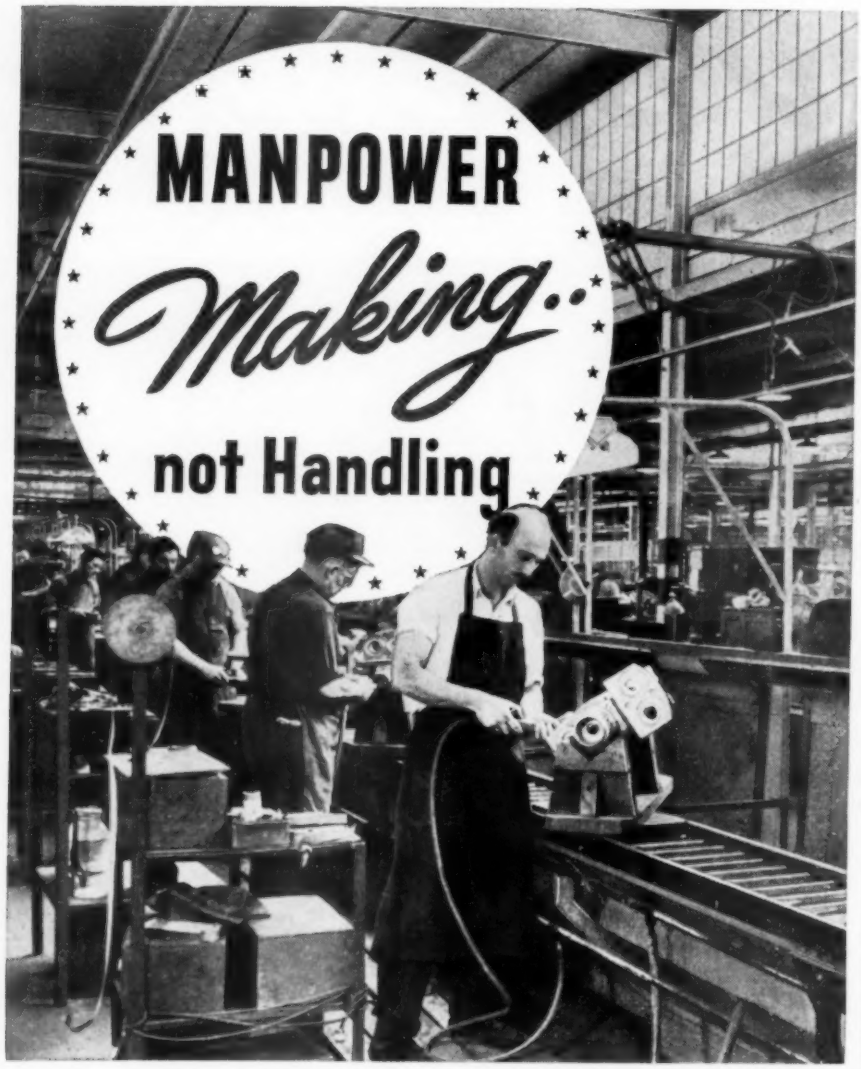
foundry Dust Problems

SAND FINES CLASSIFIER

Separation of fines and their removal by means of an exhaust system is assured in this Roto-Clone fines classifier. Its cascade action, quickly adjustable for varying permeability requirements, guarantees positive sand control. The classifier is usually installed following the sand screens. Write us about your sand problem.



Foundry Dust Control



..... Elimination of fetch-and-carry methods increases output, lowers costs, and speeds delivery

ARE you satisfied with your present material handling methods? How long has it been since you have checked the flow of materials to spot bottlenecks that reduce output?

Every unnecessary minute spent *handling* material adds to costs and delays delivery. In plant after plant, essential products are being turned out with record-breaking speed, because Standard Conveyors have been engineered and installed to do the handling part of the job.

Why not call on Standard for a checkup of your conveyor system? It will cost you nothing and will not obligate you in any way.

Time-saving and cost-cutting equipment installed for today's wartime job is an investment in postwar profits.

Write for helpful reference book—
"Conveyors by Standard"
—Catalog No. F-44.

STANDARD CONVEYOR COMPANY
General Offices:
NORTH ST. PAUL, MINN.
Sales and Service In Principal Cities

STANDARD
Gravity and Power
CONVEYORS

ENGINEERED FOR FASTER PRODUCTION

(*Concluded from page* 202)

core crushing machines; cupolas; dust collecting equipment; ladles, for transporting and pouring iron, steel and nonferrous metals; molding machines; conveyors; mold, and molding sand; ovens, core and mold sand reclaiming equipment; sand handling and sand preparation equipment; shakeout equipment; steel shot and grit for blasting; tumblast and rotoblast equipment; tumbling barrels and mills for cleaning castings. These data are based on the reports of approximately ninety companies and represent approximately 95 per cent of the industry. Repairs and replacements were approximately 15 per cent of shipments in the case of electro metal melting furnaces and slightly over 24.5 per cent in the case of foundry equipment, on the basis of reports for the year 1943. Repairs are not reflected in unfilled orders.

ELECTRIC METAL MELTING FURNACES
(000 Dollars)

	Shipments	Orders Received	Unfilled Orders
January	1,092	532	7,093
February	1,050	504	6,518
March	899	1,680	7,421
April	748	415	7,091
May	1,370	606	6,384
June	1,021	199	5,830
July	831	1,656	6,744
August	1,122	831	6,594
September	1,470	1,485	6,741
October	822	379	6,363
November	387	1,041	6,975
December	682	647	7,037
Total	10,345	9,975	....

FOUNDRY EQUIPMENT AND SUPPLIES
(000 Dollars)

	Shipments	Orders Received	Unfilled Orders
January	4,949	2,788	18,759
February	4,953	2,551	16,535
March	5,863	2,913	14,899
April	5,365	2,676	12,904
May	4,718	1,774	10,513
June	4,825	2,319	9,017
July	4,017	2,405	8,345
August	3,513	1,989	7,429
September	3,881	2,070	6,930
October	3,792	3,401	7,092
November	3,563	3,422	7,076
December	3,217	3,786	7,731
Total	53,806	32,094	....

Refer all inquiries covering these data to: Bureau of the Census, Washington 25, D. C.

Save Castings from Scrap Pile

According to a recent article in the *Bakelite Review* published by the Bakelite Corp., and Plastics Division of Carbide & Carbon Chemicals Corp., units of Union Carbide & Carbon Corp., 30 East Forty-Second Street, New York 17, two types of sealing solutions are available for overcoming porosity or small blow holes in ferrous or nonferrous castings.

A clear solution of a special resin is used for slight or fine porosity. A solution containing a finely divided mineral filler is used for more deep seated porosity. The solution may be applied according to one of two methods depending on the size of the casting. With small castings, which may be treated in

(*Concluded on page* 206)

Use new Buying Data

TO REDUCE SELECTION AND ORDERING TIME

1/2

simplified

FOR QUICKER SELECTION . . .

EASIER ORDERING . . .

QUICKER DELIVERY . . .

When you need motors and control, consult your new Westinghouse Buying Data. It will help you to select and purchase the proper equipment—in *½ the time.*

Data, as presented, is striking in its newness. It's easier to read, easier to understand, and easier to use than any offered previously by any manufacturer.

To fit widely varying requirements, this radically new Buying Data is available in two forms:

Motor and Control Loose-Leaf Book. This is for the use of large-scale purchasers and is "tailored" to meet the needs of the individual buyer. Pricing data is always kept up to date by the issuance of new price supplements.

Bound books are suitable for use of the majority of motor and control buyers. They contain prices (correct at time of issue and satisfactory for estimating purposes throughout the books' life), dimensions, application data and descriptions. Books include:

"Motor Buying Data" covering popular types and ratings of motors (up to 100 hp), Gearmotors and M-G sets.

"Control Buying Data" listing a wide variety of controllers and accessories for direct current, single-phase, squirrel-cage, wound rotor motors.

J-90499

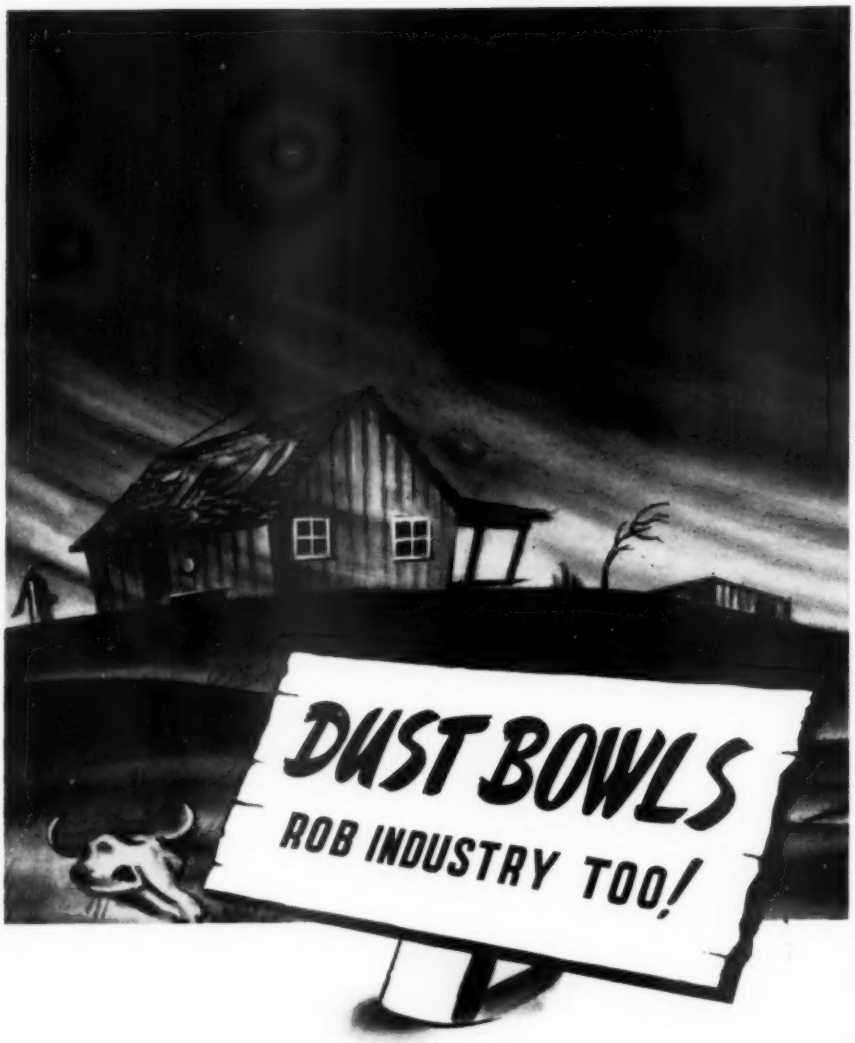
HERE'S HOW TO GET THIS NEW BUYING DATA

If you are a buyer of Motors and Control, chances are you have already received this new data by mail.

However, if you have not received your copy, write, wire or phone your nearest Westinghouse district office (requests will be filled through district offices only—no mailings from Westinghouse Headquarters at East Pittsburgh). Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Westinghouse MOTORS AND CONTROL

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



Dust bowls in industrial plants aren't spectacular but . . . they are devastating! Production Enemy Dust causes equipment breakdowns and increases rejects. Labor Agitator Dust makes workmen discontented and can become a health hazard. Overhead, Cost Expander Dust increases lighting costs, demands more painting, cleaning, and speeds depreciation. Money Waster Dust lets valuable by-products float away unsalvaged. Efficient plants are finding they must rid themselves of these industrial robber dusts.

"Dustube" collectors have proved themselves a most efficient means to solve your dust problem. They are easy to install, simple and inexpensive to operate and maintain, and frequently pay for themselves many times over in a relatively short period. The list of users of "Dustube" collectors is a veritable "Who's Who" in industry.

Don't tolerate a "dust bowl" in your plant with its attendant losses and dangers. Write for further information. Our experienced engineering staff is waiting to solve your dust problem. The American Foundry Equipment Company, 505 S. Byrkit St., Mishawaka, Indiana.

(*Concluded from page* 204)

batches, the solution may be forced into the casting by external pressure, or applied by the vacuum impregnation process in which the air is exhausted first and then the solution is forced in.

The second method involves larger hollow castings. The only essential factor is a pump to deliver the fluid and exert pressure up to 250 pounds per square inch. The casting is filled with the fluid after all the openings are stopped with the exception of one at the base for entry and one at the highest point for exit of air and as an overflow to indicate the casting is full. This opening then is stopped and the pumping is continued until a pressure of approximately 250 pounds per square inch shows on the gage. If no leaks appear over a period of about 10 minutes under full pressure, the casting may be considered sound. The casting is drained and washed and then heated for 3 hours at a temperature from 100 to 135 degrees Fahr. The sealing solution becomes hard and tough and is not affected by hot or cold water, steam, hot oil up to 270 degrees Fahr., chemicals, or heat up to 400 degrees Fahr. For all ordinary purposes the treated castings are as satisfactory as those in which no defects existed.

Double Production In Old Foundry

By RICHARD H. DAVIS
Chief Engineer
Lincoln Iron Works, Rutland, Vt.
(As told to Francis A. Westbrook)

Lincoln Iron Works, Rutland, Vt. modernized its foundries to more than double production without additions to any of the buildings, largely by the installation of up-to-date mechanical handling equipment, a new core oven, and by revamping existing space. These changes were made necessary by the demands of the war program.

Regular products of the company are machine tools for stoneworking. During the depression, business in this line was very slack, consequently there was no need for increasing productive capacity by modernization. With the war program under way this company's foundry was called upon to turn out as much work as possible.

The company operates two foundries, one for large castings including large machine tool bases, and the other for smaller castings for machine tool parts and other purposes. The first foundry is served by a 48-inch inside diameter cupola and the second by a 36-inch cupola. Practically all the castings made in both foundries are for outside machine tool builders, and for other classes of manufacturers.

Production was increased principally by the installation of motor-driven, mechanical handling equipment. Formerly in the large castings, or upper, foundry, two large hand-operated jib cranes operated slowly, did not fully cover the work

(*Continued on page* 208)

MAKE IT A MUST

to attend the Foundry Show

•

BUFFALO, APRIL 25-28

Your time will have been well spent if you see nothing more than the Cleveland CBM-39 Mogul Core Breaker (illustrated above). We will have the Mogul set up and connected to the air, so that you can take the controls and see just how this remarkable machine will speed up your cleaning room schedule and save you money.

Ask for the Cleveland Pneumatic booth. See the Mogul first. We will have on exhibit, also, our complete line of chippers, grinders, rammers, and accessories—everything in the way of pneumatic tools for the foundry.

We'll be expecting you!

See 'em at the show

CHIPPERS
GRINDERS
RAMMERS
CORE BREAKERS

THE CLEVELAND PNEUMATIC TOOL CO.
3781 EAST 77th STREET • CLEVELAND 5, OHIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES

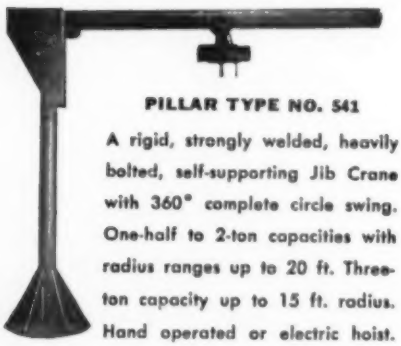
Save WITH JIB CRANES

on Point-of-Operation Jobs . . .

Stop Costly Tie-Ups of Heavy-Duty Overhead Cranes at Lighter-Duty Points of Foundry Operation!

★ Above view shows a one-man Jib Crane in action loading castings onto the rack of a heat-treating oven at a large ordnance steel plant.

Here, as in hundreds of other point-of-operation jobs in any steel plant, these Chicago Tramrail Jib Cranes are able to take over loads ranging from 1/2 to 3 tons, thereby releasing the overhead crane for its usually more productive heavy duty handling.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

for example:

at the "SHAKE-OUT"...

Operating at 360° complete circle swing, these nimble cranes take the load from overhead cranes which converge at the "shake-out". No costly tie-up or wear and tear of heavy duty equipment and you save man-power in the bargain.

Write today for Jib Crane circular. No obligation.

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Continued from page* 206)

areas and took up considerable floor space. These were replaced by two 5-ton electric traveling cranes shown in the accompanying illustration. Saving in floor space realized in this way made it possible to work on four large machine tool beds at once instead of only two.

Two cranes are required because the large machine tool beds are poured from both ends simultaneously. While setting up the molds for these beds both cranes are kept busy continuously handling the large cores. Molds are formed entirely of dry sand cores. The two also reduce waiting time to a minimum. Either crane may be operated from the floor if for any reason that should be desirable.

An interesting detail of these cranes is that the cab is suspended from the center of the bridge instead of from one end. Pits for molding the long castings are on each side of the foundry floor with the sand pile in the space between. The

Crane cab is suspended from the center of the bridge

roof of the building, never intended for travelling crane handling, is rather low. The bottom areas of both cranes are protected against heat by sheet asbestos.

The small castings foundry, in another building at a lower level, formerly had a jib crane for handling the heavier loads and of course could serve only a small part of the floor space. This was replaced by a 3-ton, floor operated, traveling crane which covers the whole foundry without wasting any space. As a result operations are speeded and larger castings than formerly can be handled. Range of work which can be done now is less limited than it was before. This crane is underslung because the roof truss braces would not permit the crane to travel on top of the tracks, and it was not deemed safe to remove them.

With the increased production thus made possible in the two foundries it became necessary to make provision for a corresponding increase in the production of cores. A new sand mixing room and a new core making room were installed. The new sand mixing room is located in a small building formerly used for storing stock castings. The castings were moved out, a concrete floor was laid, sand bins built, and a motor-driven mixer and two electrically-operated riddles were installed. The building is located con-

(*Concluded on page* 211)

A Buffalo TOPIC

When the 1944 War Production Congress of the A.F.A. meets April 25-28 in the Buffalo Memorial Auditorium, thousands of progressive foundrymen will again assemble for discussions on the industry's advancements. As always, one chief topic will be on the merits of iron, and as always, GLOBE SILVERY will again win the high acclaim it so justly deserves.

GLOBE IRON CO. originated high silicon iron production in America and was the first organization to call to the melters' attention the benefits to be derived. This leadership has never been relinquished and today GLOBE SILVERY IRON sets the pace.

BESSEMER FERRO-SILICONS
GLOBE IRON COMPANY
JACKSON OHIO
THE PIONEERS OF SILVERY IRON
SPECIAL HIGH SILICON GRADES

YOU CAN'T THINK OF SILVERY IRON WITHOUT THINKING OF GLOBE

GLOBE IRON CO.

JACKSON, OHIO

IRONTON BERLITE

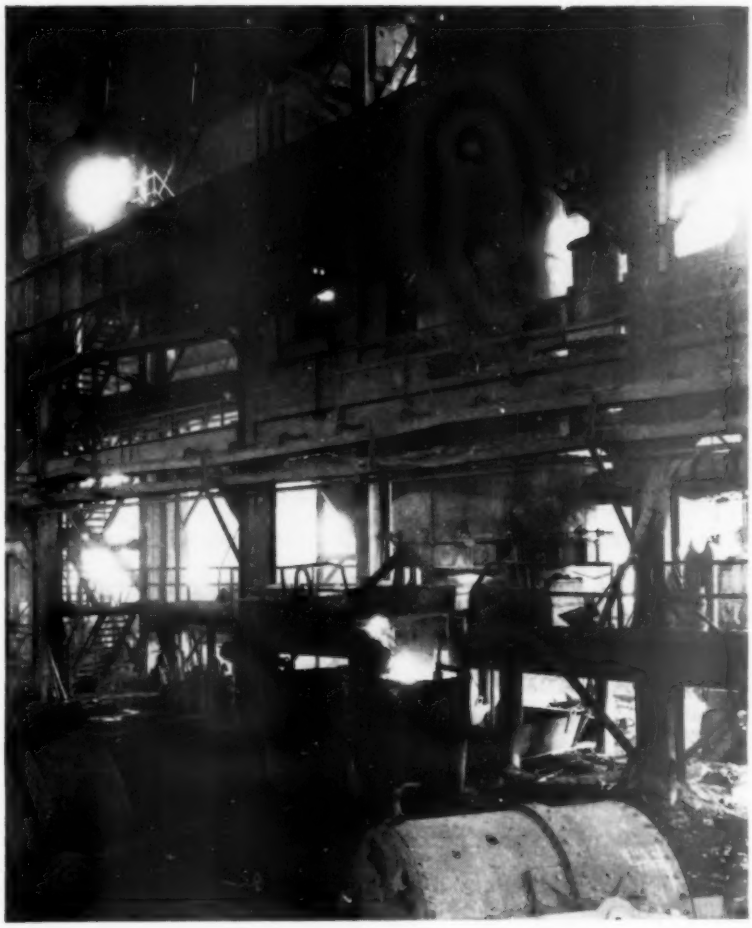
Super-Duty

REFRACTORY BONDING MORTAR FOR FOUNDRIES...

"Ironton Berlite", super-quality refractory bonding mortar, is being widely used for laying cupola blocks in the well and melting zone. It does not shrink like fire clay, it gives strong, tight joints, it is very resistant to molten metal and slag and makes the blocks last longer.

"Ironton Berlite" is also used for brick lined ladles, for laying up sidewall and bung brick in malleable iron furnaces, and for laying super-duty and high alumina brick in electric furnaces.

It gives extra long life when used as a mud lining in hand and bull ladles.



For greater brick life and better furnace efficiency, use "Ironton Berlite"

Address Box 309

THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

(*Concluded from page* 208)

veniently with respect to the core room. A concrete runway between the two buildings with a slight down-grade to the core room facilitates easy wheeling of the sand. The new core oven is 8 feet wide by 13 feet long, and 7 feet high. It is coke-fired and provided with a rolling type door because the roof of the building is too low for any other type of door. Tracks for an all-steel core car extend from the oven to a point on the floor where the cores can be handled by a hand-operated traveling crane.

Another track, also served by the same traveling crane, between the core room and the large castings foundry facilitates transportation of the cores to the molds. To lower the floor of the core room by 3 feet, thereby bringing it to the same level as the foundry floor, it was necessary to blast out several massive concrete foundations used for the machine shop equipment formerly installed in that space.

Use Alternating Current

A further advantageous feature of the core sand mixing room in its present location is that this operation formerly was performed in a corner of the small castings foundry at a lower level than the core room. The sand had to be taken up on the elevator to the core room and then the cores had to be brought back. Now it is only necessary to bring down the finished cores by elevator.

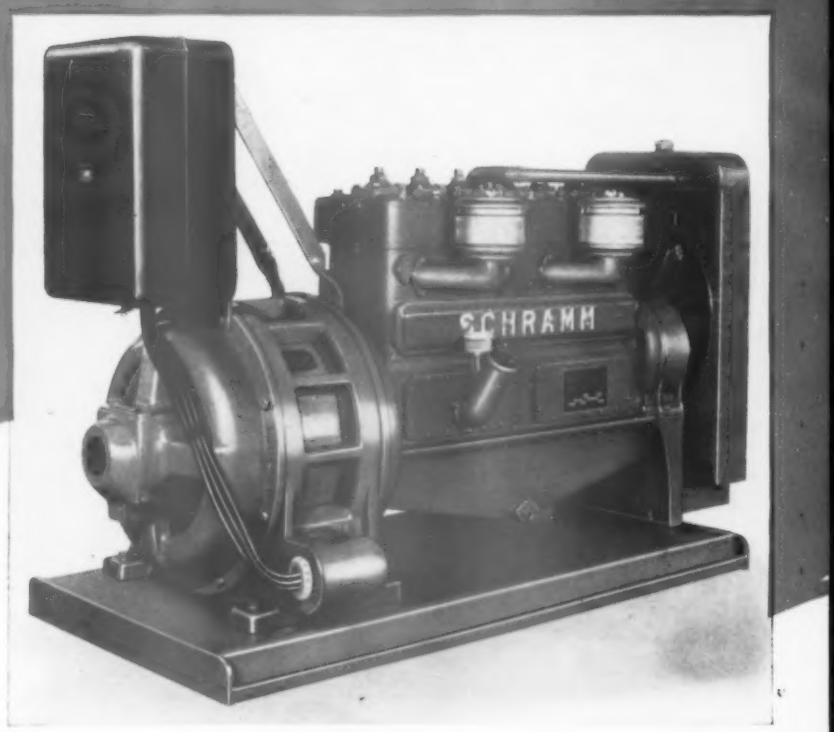
Other improvements in the foundries include the installation of fluorescent lighting and the discontinuing of all direct current electrical circuits, formerly used for the positive pressure blowers on the cupolas. Other motors in the foundries were of the induction type. Now standard, constant speed alternating current motors with short center V-belt reductions are used for these drives. Doing away with direct current is an important simplification. Since alternating current is used in other parts of the plant, it has been possible to discontinue the operation of an old direct current generator driven by the steam engine which formerly supplied a large part of the power for the whole plant. Power now is purchased at a considerable saving and the old engine is held merely for emergency service.

Book Review

The Practical Design of Welded Steel Structures, by Malcolm H. Priest; 153 pages; published by the American Welding Society, New York.

Beginning with a general description of the various welding processes, the author deals in succession with welding rods and electrodes, forms of joints, gas cutting, qualification and inspection, codes and reports, stress distributions and stress paths, temperature effects, design consideration, symbols, girders, trusses, columns, beam connections, continuous structures, rigid frames, fatigue.

Air for the Show by.. ..SCHRAMM



Built-in motor drive mounted with cooling unit and starter.

Schramm equipment has been selected to supply the air for all pneumatic equipment at the Foundry Show, Buffalo, April 25-28, and visitors will have an opportunity to observe these compact units under actual working conditions such as they would be subjected to in any foundry. Don't fail to see these efficient compressors and study their many points of advantage, such as: uniform cooling and controlled operating temperatures, greater capacity in smaller overall space and general excellence in mechanical design.

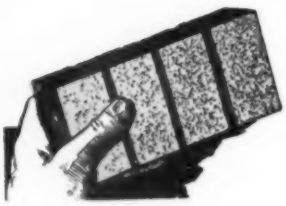
. . . . *If you can't make the show, send for catalog 42-S.*

SCHRAMM, INC., WEST CHESTER, PA.

THE COMPRESSOR PEOPLE

Schramm Air Compressors

This Year WE'LL BE WITH YOU



In the handy brick form. A brick to a ton—a briquette to each 500 pounds.

FAMOUS CORNELL FLUXES

for gray iron

The purging, purifying, quality-raising action of Famous CORNELL CUPOLA FLUX begins the moment the first brick is tossed into the cupola.

Within a few days the results of consistent use are apparent.

Despite the necessity of using larger quantities of inferior scrap today you'll be producing sounder castings — heats will be shortened — iron will be hotter and more fluid.

You'll get better results than with fluorspar which is mounting in cost daily and you'll save on fuel and limestone.

Write for literature and complete information that will enable you to prove these statements to your entire satisfaction.

"in spirit only"

Unprecedented Demands ENTAILING ENLARGEMENT of PLANT FACILITIES • • •

Require Our Constant Attention

We have always looked forward to the foundry shows for the opportunities they present to meet old friends — to make new acquaintances — to rub shoulders with the big men in the industry — to exchange helpful ideas — and incidentally, to contribute materially to better results through the sale of Famous CORNELL FLUX.

But this year we must forego the pleasure of exhibiting. Sales are pushing us too hard — to the point in fact of forcing enlargement of our plant and requiring the installation of new machinery and material handling equipment for speeding production.

But despite the difficulties this work entails our present output must not be curtailed and deliveries of Famous CORNELL FLUX must be maintained with reasonable promptness.

So, although we won't be with you in body, we shall certainly be with you in spirit, and we make the sacrifice, knowing that it will enable us to serve you still better in the future.

The CLEVELAND FLUX Co.

Manufacturers of Iron, Brass and Aluminum Flux Since 1918

1026-36 Main Ave., N. W.
CLEVELAND, OHIO

For brass

Famous CORNELL Brass FLUX produces dense castings that withstand high pressure tests and polish beautifully. It purges and purifies — gives excellent results even with dirty borings and sweepings — saves fuel and requires less tin and other critical metals.

For aluminum

Famous CORNELL Aluminum FLUX permits the use of more scrap and produces sounder castings — free from spongy and porous spots. Due to an exclusive formula it emits no obnoxious fumes. This feature alone should prompt your investigation.

CHICAGO
Mounted Wheels and Small Grinding Wheels

A complete range of styles, grains and sizes up to 3″ in diameter to give you a perfect finish on every job.

PROMPT DELIVERY

Specialization — with full W P B approval —on sizes 3″ in diameter and under, means no waiting for Chicago Grinding or Mounted Wheels. Let us take care of your present and post-war requirements.

YES, YOU CAN FINISH IT BETTER WITH A CHICAGO WHEEL

Just as the prelude to a new world is better tools of war, so the prelude to a perfect finish is better grinding wheels.

Today's standards of finishes are far and beyond those of yesterday. To acquire them without sacrifice of production time is a goal which everyone seeks.

Finish must now be measured in micro inches. That's where the new Chicago **FV BOND** Wheels excel. They give a precision smoothness so intensified that it passes any surface analyzer test, in many cases eliminating hand lapping and auxiliary finishing operations.

HERE'S WHAT MAKES CHICAGO WHEELS CLICK

A—Sensational new FV BOND. Result of research and experiment on hundreds of aircraft jobs.

B—No sacrifice of cutting time or wheel life.

FV BOND is available in all types of Chicago Mounted and Small Grinding Wheels—in all abrasives, grain and grade combinations.

TEST WHEEL FREE — To prove their superiority in your own shop, send for a Chicago Wheel made with **FV BOND**. Give us details of the job, material you want to finish and we'll do the rest.

Write for Catalog and interesting Engineering Survey Form

CHICAGO WHEEL & MFG. CO.
1101 West Monroe Street Dept. FD Chicago 7, Ill.

FREE Engineering Analysis

If you have a grinding job that presents a problem because of the nature of material, tricky shape or other reason, tell us about it. Our experts will go into a huddle and give you the benefit of our long experience making millions of custom built wheels for every conceivable operation.

Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Abrasive Industry.

Send Catalog and Survey Form. Interested in FD-4
☐ Grinding Wheels
☐ Mounted Wheels
☐ Send Test Wheel
NAME
Size ADDRESS

OBITUARY

WALTER E. Naylor, 56, foundry engineer, Champion Foundry & Machine Co., Chicago, died Feb. 26 in that city. He became associated with the company in February, 1940, after 16 years with the Beardsley & Piper Co., Chicago, as foundry engineer. Prior to that he spent 9 years with International Harvester Co., being a draftsman at the Deering Works, Chicago, and during this period served one and one-half years in the United States Army.

° ° °

William G. Kranz, 72, former vice president and a director of the National Malleable & Steel Castings Co., Cleveland, died March 5 in that city. A graduate of Cornell University, Mr. Kranz joined National Malleable in 1899 as works manager of the Sharon, Pa., plant. He was transferred to Cleveland in 1916 as vice president in charge of operations, the position he held until his retirement in 1938. Mr. Kranz was one of the organizers of the Sharon Steel Hoop Co., Sharon, Pa., now the Sharon Steel Corp.

° ° °

Thomas H. Williams, 63, president, E. A. Williams & Son Inc., Jersey City, N. J., died at his home in that city March 9, after a long illness. He was a grandson of the founder of the company, which is one of the oldest brass foundries in New Jersey, and which made the bearings on which moved the turret of the MONITOR, ironclad fighting ship of the Civil war. He was born in Jersey City and was graduated from the Sheffield Scientific School of Yale University in 1903.

° ° °

Fred W. Lemke, 68, vice president and superintendent of the Quality Aluminum Casting Co., Waukesha, Wis., died in Milwaukee Feb. 16 following an automobile accident. A pioneer in the aluminum casting industry, Mr. Lemke had been engaged in the business in Waukesha for the past 30 years.

° ° °

George A. Burman, vice president of the Wolverine Foundry Supply Co., Detroit, died Feb. 3 in that city. Mr. Burman had been identified with the foundry industry for more than 50 years, having started with the Dunkirk Radiator Corp., Dunkirk, N. Y.

° ° °

James E. McDonald, 53, general sales manager of the Edward Valve & Mfg. Co. Inc., East Chicago, Ind., died Feb. 25. Associated with the company since 1917, Mr. McDonald formerly was chief engineer and plant superintendent.

° ° °

Harvey N. Dean, 47, Chicago district manager, North American Refractories Co., died Feb. 27 in Flossmoor, Ill.

° ° °

George W. Thornburg, 64, founder of the Crescent Park Brass Foundry, Waltham, Mass., died recently.

(*Concluded on page* 216)

GOOD OVENS

Bake cores and molds at maximum speed.

•

Require less fuel per bake.

•

Produce dependable cores and molds consistently.

•

Can be engineered for any type of heating, any kind of fuel and any method of handling the product.

NOW IS THE TIME to prepare for Postwar Competition and Oven Equipment is an Important Thing to *Check*

YOUNG

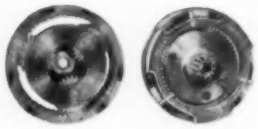
BROTHERS COMPANY

6508 MACK AVENUE

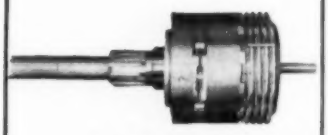
DETROIT, MICHIGAN

let's see what makes it

tick



PLANETARY GEARING



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WRITE FOR YOUR FREE COPY OF THIS MAINTENANCE MANUAL

106 pages—amply illustrated with sectional views and line drawings. Describes maintenance of entire line of Shepard Niles Electric Cranes & Hoists.

Ever look inside a Shepard Niles hoist? If you did, you would find exactly the same construction as used on a Shepard Niles crane trolley.

While a single beam hoist is seldom called upon to lift the heavy loads that a crane trolley must handle, nevertheless, the service very often is just as severe. Recognizing this, Shepard Niles simply eliminated the axle bracket arms of their Shepard-type crane trolley, provided suitable means of suspension, and a hoist, capable of the toughest kind of going was the result.

The "Balanced Drive", based upon the planetary gearing principle where all stresses are evenly distributed throughout the drive; the Oil Bath lubrication; the load brake which allows the load to be lowered *under full control*—all are features of Shepard Niles crane trolleys and are present in Shepard Niles single beam hoists.

Qualified Shepard Niles sales engineers are located in all war-production centers to consult with you in determining the exact type of equipment you will need to obtain maximum efficiency in your materials-handling operations.

Shepard Niles

CRANE & HOIST CORPORATION

360 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

(*Concluded from page* 214)

Paul Pufahl, 61, founder of the Paul Pufahl & Son Foundry, Minneapolis, died in that city Feb. 21. He had been associated with foundries in the Twin City area since 1910 prior to founding his own company in 1937.

° ° °

Joseph Stuart, vice president in charge of engineering of the Lobdell Co., Wilmington, Del., died recently as the result of an automobile accident. Mr. Stuart had been connected with the company for more than 60 years.

° ° °

Harold D. Kramm, who for the past 25 years has conducted the Maluminum Co., Indianapolis, a foundry supplies firm, died Feb. 23 in that city.

° ° °

S. H. Griffiths, 63, metallurgical engineer for the Ohio Steel Foundry Co., Lima, O., died March 12 at Canton, O.

Plans Research on Heat Transfer

G. Stanley Meikle, research director of the Purdue Research Foundation and A. A. Potter, dean of the Schools of Engineering, have announced the establishment of a new joint industry education enterprise at Purdue University, Lafayette, Ind., for the "intensive training of graduate students in exploring the field of heat transfer for data upon which many of the practical developments of the future depend."

Made possible by a $75,000 grant from the Westinghouse Electric & Mfg. Co., the five-year training and research program will be directed by Dr. George A. Hawkins of the Purdue faculty who has been appointed Westinghouse research professor in heat transfer. Dr. Max Jakob of the Illinois Institute of Technology will co-operate with Dr. Hawkins in the capacity of nonresident research professor.

Lists Laboratories

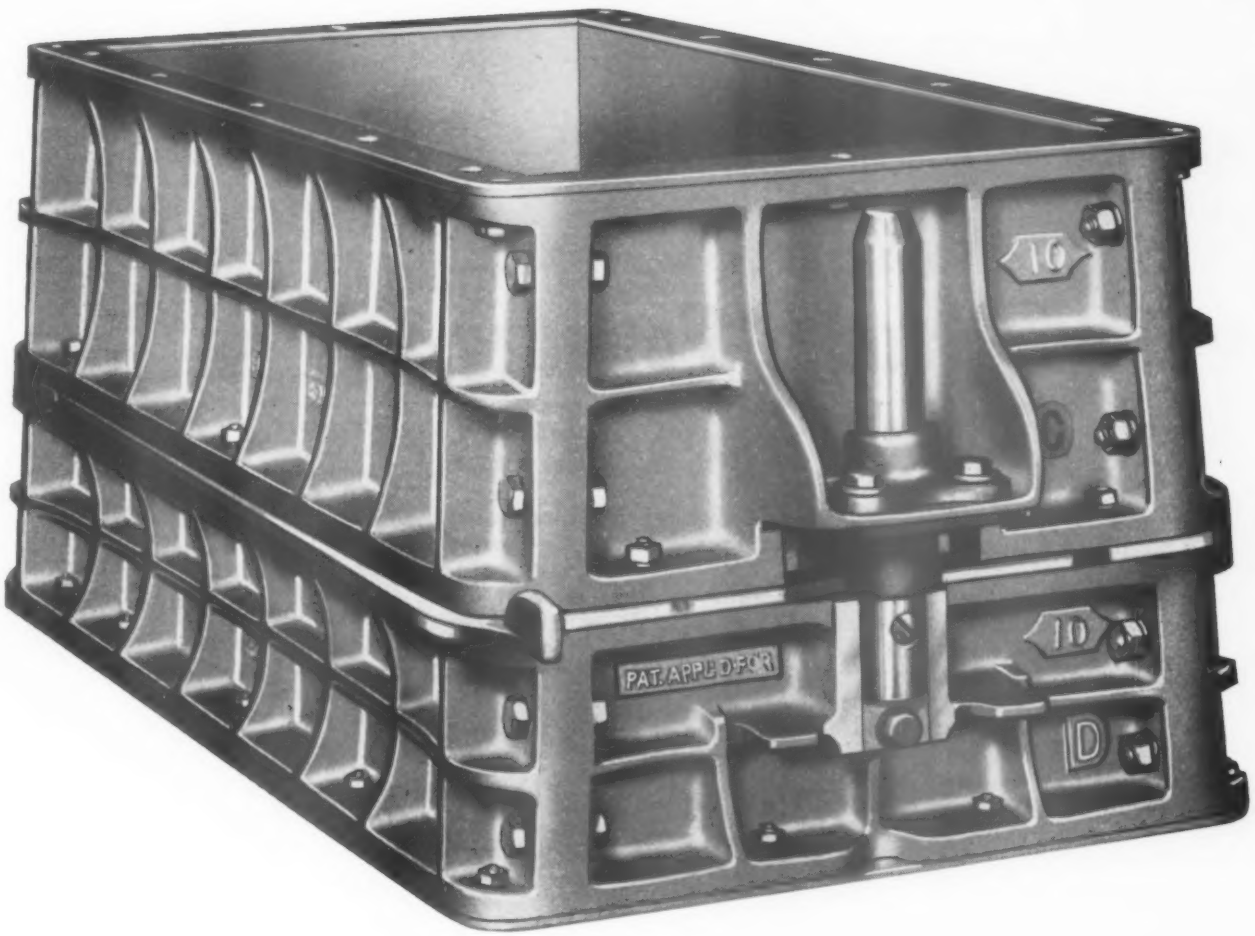
American Council of Commercial Laboratories, 63 Wall street, New York, has published a 32-page booklet giving the names and addresses of its members, as well as the types of work they are equipped to perform. Information also is presented on officers of the various firms, size of technical staff, scope and activity, and other pertinent information. Copies of the booklet may be secured by writing to A. J. Nydick, secretary.

Facts on Asbestos

The second edition of *The Asbestos Factbook*, published by "Asbestos", Inquirer Building, Philadelphia 30, recently was issued. It contains such information regarding asbestos as origin, uses, analyses, qualities, etc., and is available at 10 cents a copy.

Fremont Flasks again available in MAGNESIUM METAL

PROMPT ATTENTION GIVEN ALL ORDERS



FREMONT FLASKS have established a reputation for efficiency and long wear and in most progressive foundries have replaced the old type, cumbersome, heavy weight equipment.

The FREMONT FLASK with the 1" GROOVLOCK PIN is especially adapted to snap work but can also be furnished with cast ears to accommodate other pins.

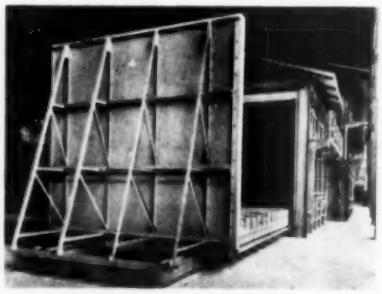
Slip Flasks **FREMONT** Jackets

GROOVLOCK

THE FREMONT FLASK CO...FREMONT, OHIO

Built to Handle Foundry "Pay-Loads" FASTER!

The two furnaces pictured above provide typical advantages of VULCAN-engineered installations . . . maximum capacity, a shorter over-all treatment cycle, complete control, and important savings in operation and maintenance. Direct fired furnace (left) is used for annealing and normalizing miscellaneous castings, at temperatures up to 1800° F. Convection furnace (right) operates at a maximum of 1150°F., for stress relief of castings and weldments. Each is equipped with complete program control, including rates of heat rise and cooling; motorized car and door; and transfer car control. Oil fired, but can be arranged for gas firing with assurance of equally efficient operation.



Setting the Pace for Both Size and Efficiency . . . .

Illustrations at right show two VULCAN furnaces built to handle exceptionally large, heavy charges. Upper-Car hearth furnace for annealing and normalizing large castings and weldments. New method of direct firing produces a convection-effect. Lower-Car hearth furnace for annealing, normalizing and stress relieving large marine castings and weldments. Direct fired, with improved oil circulating system. Temperature range: 700°F. to 1800°F. Two-zone control.

In furnaces, its the engineering that counts. The outstanding success of VULCAN installations in many important war production plants is proof of the skill and experience of VULCAN engineers. Consultation will incur no obligation.

VULCAN CORPORATION
1797 CHERRY STREET, PHILADELPHIA, PA.

FACTORS IN MAKING QUALITY CASTINGS

(*Continued from page* 130)

only by the quantity of steel added to the cupola but also by the pouring temperature of the metal and alloy additions. A high temperature will increase the tensile strength of the iron as much as 10 per cent by slight changes in the form of the graphite.

The total carbon can be regulated largely by the percentage of steel in the mixture and to a lesser degree by allowing the metal to remain for a longer time in the well of the crucible in contact with the coke.

Another factor involved in cupola combustion is the reactivity of the coke. The amount of CO formed will vary somewhat, especially where the physical character of the coke varies with other conditions remaining constant. Soft easily-burned varieties produce more CO than the hard, less easily burned types. Character of the coke also influences the total carbon of the metal as well as the structure and physical properties of the metal. Total carbon, its amount and structure are important in obtaining results in producing a quality and uniform iron.

Control Carbon Content

In order to control cupola carbons it is necessary first to have a suitable charge, then use a suitable coke, then employ a suitable melting technique and finally a suitable tapping technique.

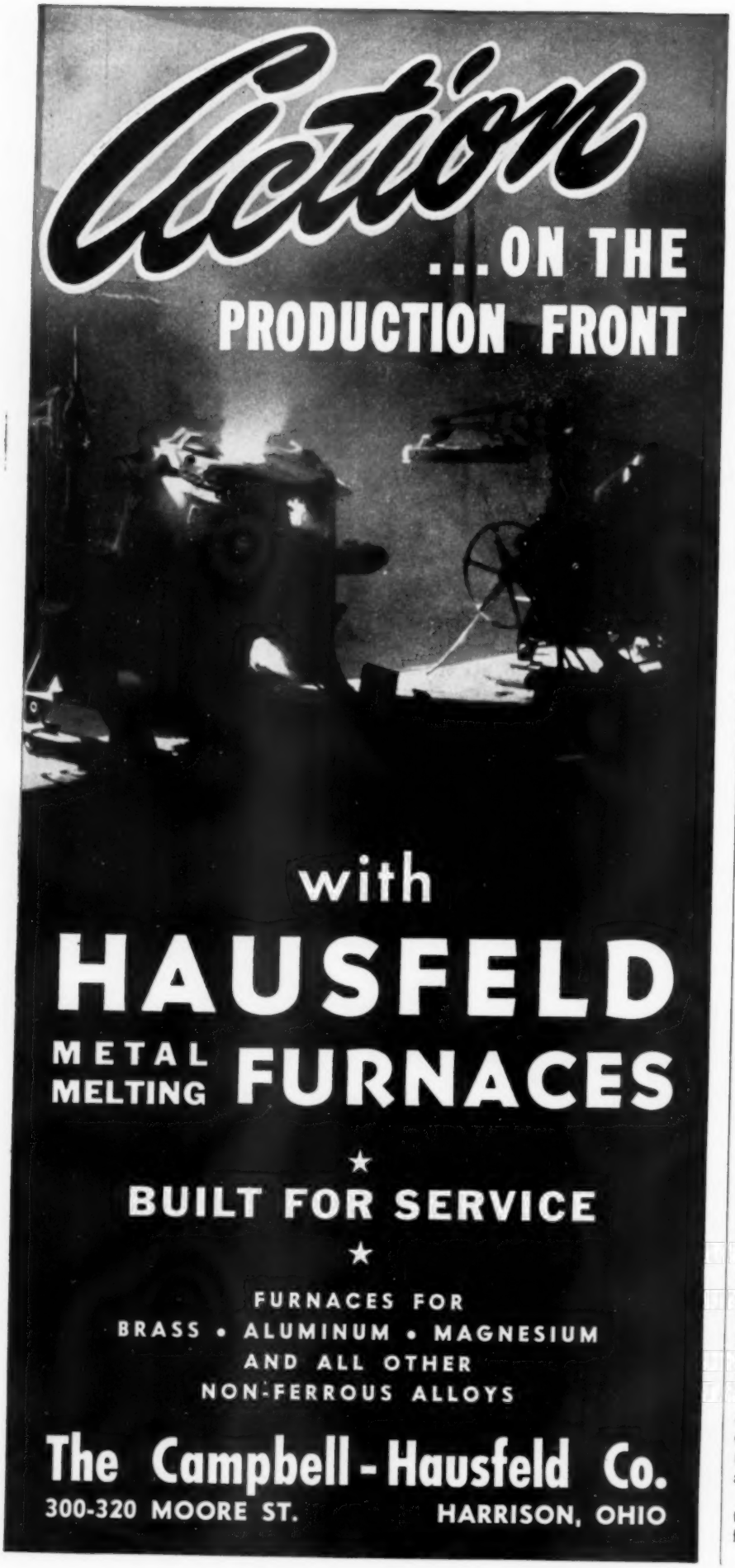
Quality of the product often is dependent on the proper pouring temperature, especially in the manufacture of castings for high physical properties. The desired pouring temperature for iron of high physical strengths is above 2650 degrees Fahr. Lower pouring temperatures will result in lower physical properties. It is possible to obtain strengths as high as 70,000 pounds per square inch and as low as 50,000 pounds per square inch from the same metal poured from the same ladle but at different pouring temperatures.

The one objection of the foundry to pouring castings hot is the fact that the molding sand will not withstand that temperature. The answer is to produce a molding sand that will stand these high temperatures. Pouring hot is essential whether the casting be large or small, thick or thin, if the best work is to be produced. Very often lack of density in a casting is due to pouring at a low temperature, resulting in blow or slag holes.

To control pouring operations it should be seen that the molds and the pouring off of these molds are organized properly so that frequent shutdowns in the cupola are avoided. The ladle should be clean, properly dried and hot. A defi-

(*Continued on page* 220)

We've moved a
lot of dirt in 80 years
to get the selected
flint and 'semi-hard' Fire Clays from Olive Hill, Kentucky,
P. B. SILLIMANITE from the mountain country above Calcutta, ZIRCON
from Australia. These high quality fire clays, kyanite, and other raw
materials are needed to make the TAYLOR line of Refractories so complete.
From mining, careful selection, grading of raw materials to final inspection
of 'Taylor-Made' refractories, every step is supervised by skilled men.
Ceramic engineers check for quality and uniformity, see that the r-i-g-h-t
refractory is supplied to withstand service conditions in your furnaces.
In 80 years we've learned a lot about making refractories better.
Take advantage of our complete refractories service and long
experience. A TAYLOR field engineer or representative
is as near as your telephone.
Tyson - Tiger Steel
P. B. Sillimanite - Zircon
CHAS. TAYLOR SONS Co.
MANUFACTURERS OF REFRACTORIES • CINCINNATI • OHIO • U S A



(*Continued from page* 218)

nite program should be decided beforehand to determine the method of handling the metal.

Sufficient time should be taken to set the ladle properly at the pouring basin. The empty ladles should be returned to the cupola quickly to retain ladle temperature and avoid shutdown. Splashing against the basin should be guarded against; also, the basin should be filled quickly but not to overflowing. It is important to maintain the metal in the basin at a sufficient depth in order to maintain a full sprue at all times. Ladle lips should be kept clean. All these items tend to produce defects, and their correction will improve the quality of the iron.

New developments have shown that by heat treating an alloy cast iron, strengths approximating 100,000 pounds per square inch can be produced. However, unless all of the techniques in foundry practice are satisfied it is very often possible that a 30,000 pound iron will produce more satisfactory results in operation than a 100,000 pound iron especially if the higher strength iron contains defects such as blow-holes, shrinks, dirt inclusions and defects of a similar nature.

Certain foundries control the moisture content of the air blast to attain a more uniform product, and others preheat the air blast by means of waste heat regenerators to secure fuel economy.

Castings Are Hard

It has been the experience of many foundrymen that for certain types of very thin castings, particularly piston rings, that frequently it had been necessary to reject castings produced during very humid weather due to excessive hardness (chill effect in edges of rim opposite gate). The rejected castings were higher in combined carbon but lower in total carbon than those produced in dry weather. The trouble usually was encountered after the cupola had been in operation approximately one and one-half hours, and the first remedy was to increase the holding time of the metal in the well of the cupola with the blast off, or to increase the amount of coke per charge. Both methods tended to increase the total carbon. However, the trouble was eliminated by the installation of a system to reduce the moisture in the blast or by a combination of hot blast and reduced moisture.

In order to show the effect of moisture upon the melting conditions let us remember that a cupola melting 100 tons of iron per day will use approximately 2,500,000 cubic feet of air. Water content of the air will vary between 2 and 12 grains per cubic foot from a very dry air to a very wet air. Therefore the amount of water drawn into the cupola during the melting of 100 tons of iron may be as low as 750 pounds or as much as 4500 pounds.

Chill is dependent upon the composition of the iron, and in turn this is affected by the moisture content of the

(*Continued on page* 224)

Marabond

For Cores... LARGE AND SMALL

Both photographs show Marabond production cores in a prominent Middle Western Steel Foundry.

CORES MADE WITH *Marabond* SHOW THE FOLLOWING ADVANTAGES:

SMOOTHER CASTINGS—Decreased Cleaning Room time and labor.

EXCELLENT COLLAPSIBILITY—No Hot Tears and easy Shakeout.

NO ACRID OR NAUSEATING GAS—In Core Room or on the Foundry Floor.

FASTER BAKING—Both Time and Temperature may be reduced.

REDUCED COSTS—Total Cost of all ingredients materially reduced.

FOR CONDITIONING HOT RECLAIMED SAND for backing mixes, *Marabond* is likewise extremely valuable. Ordinarily such hot sands promptly lose their tempering water and become so stiff as to be unworkable when the molder attempts to use them. By adding ¾%-1% of *Marabond* to this mix and tempering to 6-7% moisture, such hot black sand will automatically level out and remain at a moisture content of 3%-3½% for an extended period. This results in a constantly workable backing sand without extensive retempering on the foundry floor.

STOP BY OUR BOOTH AT THE FOUNDRY SHOW..or Write for Additional Information

Produced by the Makers of LIGNOLITE PATTERN PLATES

MARATHON CHEMICAL COMPANY

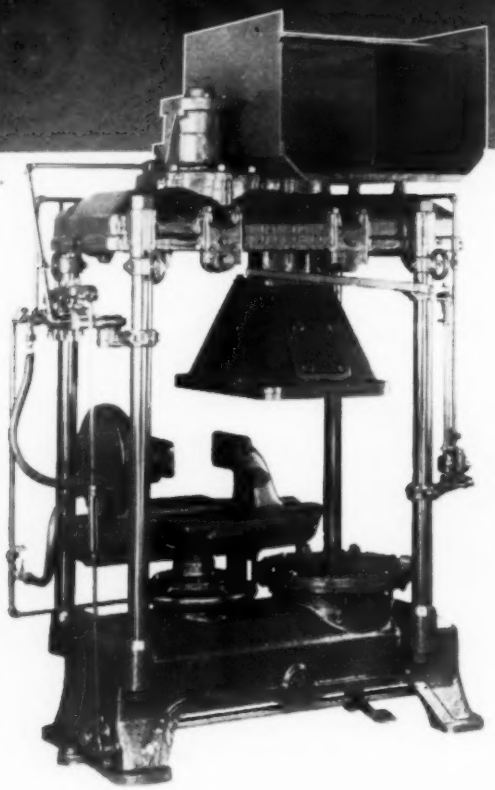
DIVISION OF MARATHON PAPER MILLS COMPANY

ROTHSCHILD WISCONSIN

INTERNATIONAL
Sand Blowers

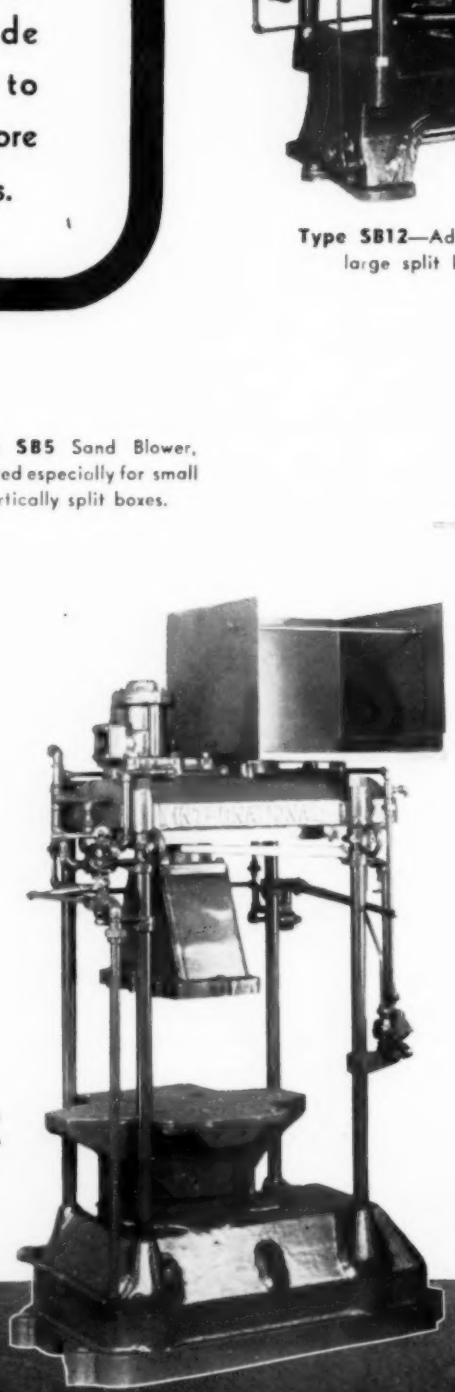
are designed for Speed in Operation, Ease of Handling, and for the making of BETTER CORES.

There is an INTERNATIONAL Sand Blower to fit your every need. A call will bring an INTERNATIONAL Service Man with wide foundry experience to help you solve your core making problems.

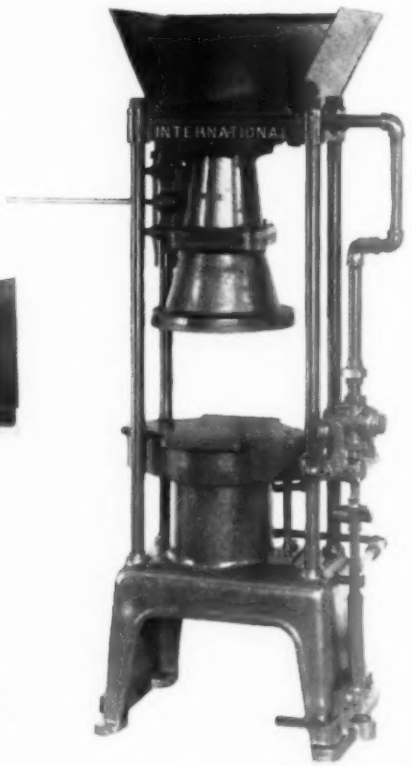


Type SB12—Adapted for large split boxes.

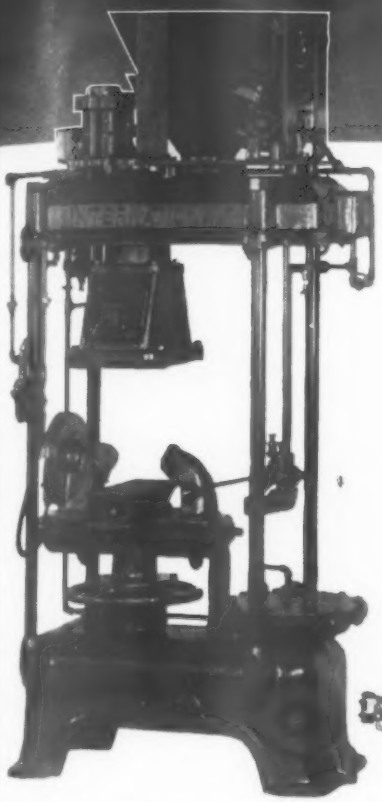
Type SB5 Sand Blower, adapted especially for small vertically split boxes.



Type SB11—For medium sized cores with air clamp and draw feature.

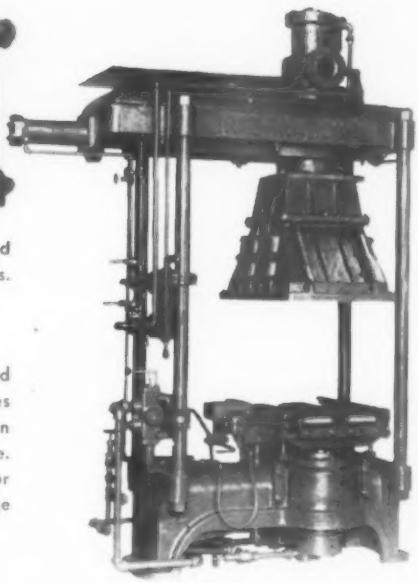


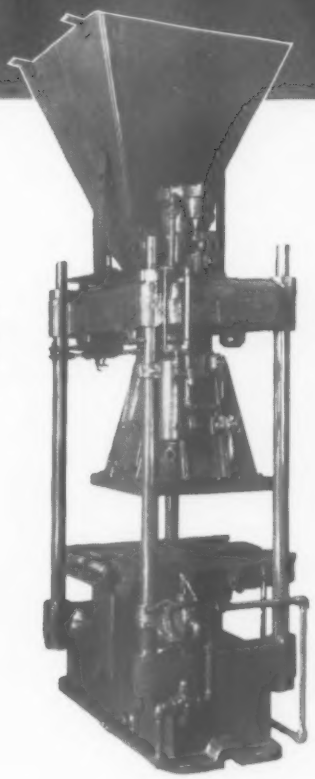
Type SB7 Sand Blower, adapted especially for small horizontally split boxes.



Type SB10—Sand Blower, adapted especially for medium size split boxes.

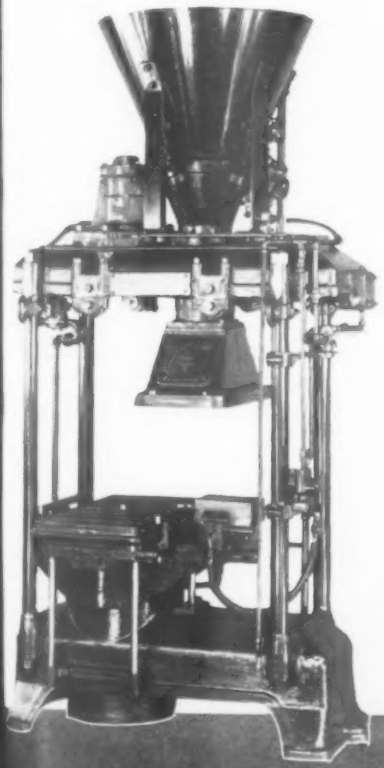
Type SB13—Sand Blower adapted especially for horizontally split boxes of medium size, but larger than can be handled by the **SB11** machine. May be had with the roll-out conveyor feature for ease in handling large core boxes.





Type SB15-H is adapted for the making of extra large Cores. Hydraulic clamp and draw feature.

Type SB17-H Sand Blower is the right machine for blowing those Super-Cores weighing up to 350 lbs.



INTERNATIONAL

Sand Blowers and Molding Machines

are busy in every part of the country, working on High Production schedules turning out the tools of war. INTERNATIONAL engineering ability is helping to spell out in large letters:

* * * * * V I C T O R Y ! * * * * *

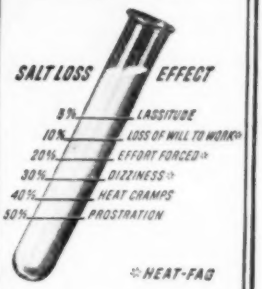
INTERNATIONAL MOLDING MACHINE COMPANY

2608-2624 West Sixteenth Street * Chicago 8, Illinois

WORKERS *Need Salt-*

Supply it- this easy, simple way for less than 1c a man per week

This Is What Happens When Sweating Robs the Body of Salt . . .



At hard work on a hot day, a worker can easily throw off several quarts of sweat — sweat that robs his body of vital salt.

Salt is a balance wheel in the human body. It keeps body fluids in equilibrium and gives tone to the blood. When salt is lost the body is dehydrated and the blood thickens. The result is Heat-Fag, lassitude, inalertness. Production suffers, accidents increase, absenteeism is common.

But loss of body fluids causes thirst. Excess water without salt under these conditions, dilutes body fluids and causes heat cramps.

The easy, simple, sanitary way to replace the salt lost through sweat is with Morton's Salt Tablets. It costs less than a cent a man per week to have Morton's Salt Tablets available at every drinking fountain.

Physicians with America's largest manufacturing plants have the figures to show that this cuts down Heat-Fag, heat cramps, heat prostrations. Production stays up. Accidents stay down.

QUICK DISSOLVING
(Less than 30 Seconds)

This is how a Morton Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds.

Case of 9000, 10-grain salt tablets - - - - - - $2.60

Salt-Dextrose tablets, case of 9000 - - - - $3.15

MORTON'S Heat-Fag SALT TABLETS

MORTON'S DISPENSERS

They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - - $3.25

Order from your distributor or directly from this advertisement . . . Write for free folder.

MORTON SALT COMPANY, Chicago 4, Ill.

(*Continued from page* 220)

air. It has been shown that an increase in the moisture content of the air blast causes a decrease in metal temperature and melting rate and an increase in the manganese and silicon losses. This indicates oxidation. Lower carbon contents are obtained with high moisture air. Chill is increased with a decrease in carbon and silicon contents.

Another method of improving the cupola operation is to preheat the air. In the use of preheated air the metallurgical losses of silicon and manganese are reduced considerably, and the substitution of hot air for cold air also reduces the cooling effect on both metal and slag so that it is possible to tap hotter metal and operate the cupola for a longer period of time when using preheated air.

Preheating the air blast to 900 degrees Fahr. results in an increase in the tapping temperatures of 100 to 150 degrees Fahr., increases the melting rate, decreases the silicon and manganese losses and allows a reduction in coke consumption of about 20 per cent. Preheating the air has no individual effect on the properties except as higher temperatures affect cast iron.

Very often it is said that the aforementioned accessories for cupola operation are unnecessary. In many cases this is absolutely true, but to produce certain types of quality castings economically and to obtain uniformity through variable atmospheric conditions, these regulations for control often are essential.

Different Conditions Prevail

The casting which an individual manufacturer produces may not be sufficiently sensitive to detect these qualities. Consider the manufacture of piston rings —a very light section—and the manufacture of a machine tool base, a very heavy section. These are two entirely different conditions in so far as the machineability of the castings are concerned.

It is the general opinion that any piece of equipment that will eliminate a variable from cupola practice stands an excellent opportunity to make good for certain types of castings.

Shakeout, heat treating, and cleaning operations must be carefully considered if quality castings are to be produced. More castings warp by shaking out than in any other way. A careful study should be made of all stripping and shaking out procedure. Shaking castings out too quickly may cause warpage and hard edges. Castings should be processed with precision in the heat treating operations if quality castings are to be produced. Proper cleaning of the castings is essential. Sand retained on the casting often increases machining difficulties and may seriously impair tool life and production schedules.

Extent of the effect of the human element in producing quality castings will vary according to the procedure adopted. In large production foundries, where the

(*Continued on page* 226)

Outstanding Wheels for Steel Castings..

NORTON RESINOID

14/2-P4T-L for Swing Frames
14/2-O4T-L for Floor Stands

These recommendations are based on medium pressure and medium contact. Light pressure or large contact would mean slightly softer wheels while heavy pressure and small contact would call for somewhat harder grades.

In each case you are sure of a snagging wheel that's engineered for its job—special resinoid bond formulae developed by Norton research for foundry grinding plus Alundum abrasive especially selected for snagging work.

There are also Norton Resinoid Wheels of Crystolon abrasive for gray iron and unannealed malleable castings. Call on your Norton abrasive engineer for recommendations.

NORTON COMPANY
Worcester 6, Mass.

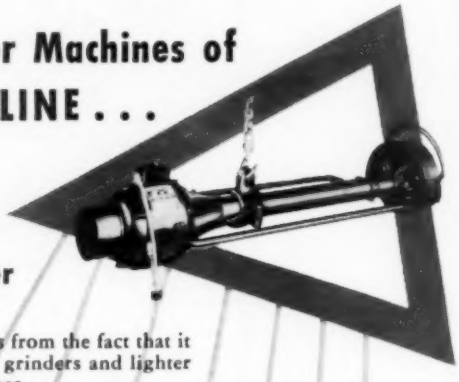
W-957

NORTON ABRASIVES

MARSCHKE Grinders and Buffers

You get a good picture of the wide variety of more than 70 standard Marschke specifications by comparing the small Direct-drive "In-Between" Swing, with the big massive Vari-Speed Floor Stand Grinder. The Marschke Line includes grinders and buffers with power capacity ranging from 1 to 40 HP. and with 10″ to 30″ wheels. Marschke catalogues and special bulletins are yours upon request.

One of the Smaller Machines of The MARSCHKE LINE . . .



★ Direct-Drive
"In-Between"
Swing Frame Grinder

The name of this machine derives from the fact that it fits between heavier swing frame grinders and lighter portable and flexible shaft machines.

It is made with 3 HP., 1800 r.p.m. motor driving a 12″ diameter wheel or a 3 HP., 3600 r.p.m. motor driving a 10″ wheel.

This sturdy little machine has magnetic push-button control, overload and undervoltage protection, bronze-bushed swivel collar suspension with handle along each side of frame and one above guard.

It is unusually maneuverable and work is always in view of operator. Ample pressure is conveniently applied to assure metal removal up to full motor and wheel capacities. This machine is more productive, and self-evidently, also more durable and dependable than lighter portable and flexible shaft machines.

The BIGGEST *and* BEST *of the Kind!*

★ MARSCHKE VARI-SPEED GRINDERS

25 to 40 HP. Motors—24″ to 30″ Wheels

This massive floor stand grinder is definitely the BIGGEST and BEST machine of its kind on the market today. There is a choice of 24″ to 30″ wheels driven by 25 to 40 HP. motors with automatic wheel speed changes to maintain uniform wheel rim speed. The combination of POWER and WHEEL SPEED CONTROL gives you maximum metal removal at minimum abrasive cost. This Marschke also has the "backbone" to stand up under the severe strain of EXTRA WORK. It's certain to be your choice for heavy duty service and it doesn't take it long to pay for itself. Write for Marschke Bulletin No. 51 to . . .

VONNEGUT MOULDER CORP. 1839 MADISON AVE. INDIANAPOLIS 2, IND.

(*Continued from page* 224)

castings are of a repetitive nature and are generally mechanized to a considerable degree, the effect of the human element is reduced. In foundries of this kind the operator has only a few operations to perform. Unfortunately, a very large volume of castings are produced in jobbing foundries. This general type of work often calls for individual experience and skill in many of the operations, and here the human factor will have a decided influence on the quality of the casting produced.

This condition emphasizes the basic need of the industry for apprentice training courses. Apprentice training definitely is a function of management. Although the industry in a large measure has been mechanized within the past 15 years a means must be provided not only to train the needed skilled workers but also to train the men required to operate and supervise the foundries.

A program of this nature first must consider a policy regarding the selection of the men and the type of training course, the latter including class training and foundry training.

One of the greatest advantages of the apprentice training plan is the placement of men in supervisory capacities. Very often experienced men leaving the employ of the company are difficult to replace immediately. The young man who has had the required training may well accept this job with some confidence and assurance of success.

Organize an Apprentice Club

There may be some difficulty in securing satisfactory apprentices in foundries located in metropolitan areas. To counteract this condition all apprentice courses require good will and co-operation among the boys and a similar interest on the part of the management. It has been suggested that an organized apprentice club often may be the solution to this problem.

Not long ago little attention was paid to what is now termed good housekeeping methods. Irritating and toxic gases and fumes, particularly those of lead and zinc, often seriously affected the workers. At present the average establishment where but comparatively few men are employed are, in many instances, housed in buildings erected for the purpose where adequate lighting is used and in general good ventilation is provided. This is done to provide a healthful foundry atmosphere.

Not only have good housekeeping methods proved of definite benefit in reducing accidents and improving the health of the worker, but in many cases it has stimulated the morale of the employe who is desirous of a clean and safe place in which to work. The time and money spent in maintaining a clean plant has proved a profitable investment in producing quality castings even though the casting may be classed as an intangible.

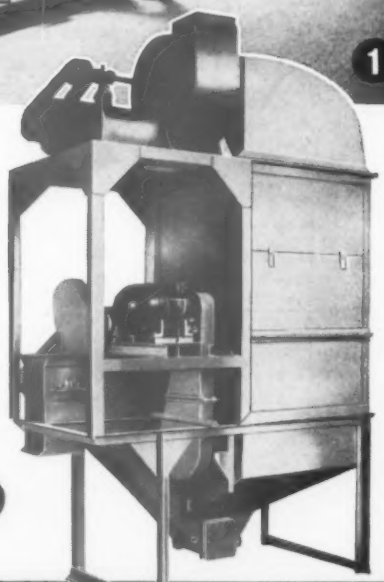
It might also be mentioned that at present every foundry organization is giving serious consideration to the pre-

(*Concluded on page* 228)

Hydro-Whirl.. the Efficient Method of DUST CONTROL

In foundries, grinding and polishing departments . . . wherever Dust is a menace to health and production . . . the modern Hydro-Whirl method of dust control can be depended upon to serve efficiently and economically. Whether your problem concerns the installation of a single unit or involves the planning, designing, engineering and building of a complete system, we invite you to discuss the subject with us.

The engineers of Peters-Dalton have developed dust collectors of all sizes from the small individual, portable unit of 700 C.F.M. to the huge central systems of 100,000 C.F.M. Shown are typical installations of Peters-Dalton equipment, each designed to meet a specific dust collecting problem.



1 Department of twenty double spindle grinding and polishing lathes connected to a Peters-Dalton installation. The 28,000 C.F.M. Hydro-Whirl unit may be seen in right background.

2 Rotor type Hydro-Whirl of 4,000 C.F.M. used for core sand handling.

3 Compact, self-contained, portable 700 C.F.M. Hydro-Whirl; easily moved anywhere. Available left or right hand, as shown.

4 Battery of Hydro-Whirl Magnesium Grinding Booths—part of an installation of 200 units—built for large magnesium fabricating manufacturer.

HYDRO-WHIRL

PETERS-DALTON *Incorporated*

625 EAST FOREST AVE. • DETROIT 1, MICH.

(Formerly Industrial Sheet Metal Works)

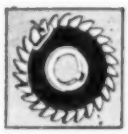
MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS—INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATING SYSTEMS

Castolin Eutectic*

EUTECTIC*
(Means Lowest Binding Alloy)
LOW TEMPERATURE
WELDING

WHY EUTECTIC IS
THE FASTEST GROWING
WELDING ROD
(for oxy-acetylene, metallic arc, etc.)
IN AMERICA

The acceptance gained by Eutectic Low Temperature Welding Alloys in two short years is unmatched in the Industry. The reason—Eutectic Low Temperature Welding (for salvage, maintenance and production) offers advantages never before combined in any welding process.



HIGH STRENGTH

Eutectic joints equal or surpass parent metal in tensile strength . . . 2 to 3 times stronger than brazing or soldering.

PERFECT MACHINABILITY

Eutectic Alloys bind at safe, lower temperatures, thus eliminating stresses, distortion, brittleness.

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With Eutectic you can have undetectable, color matching welds . . . another advantage over brazing. (Important for salvage)

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Thin flowing Eutectic Alloys give stronger joints without fillets . . . Lower temperatures are reached faster and preheating is reduced. Smooth joints eliminate after-machining.

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Do you weld cast iron, steel, alloy steel, aluminum, brass, bronze, copper, nickel, nickel alloys, Dow-metal? . . . One of 43 Eutectic rods will do a better job and effect considerable economies in your plant.

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(*Concluded from page 226*)

vention of occupational diseases and to control of industrial accidents. Also many foundries both large and small have planned safety organizations sponsored by the management. All this indirectly affects the quality of the castings produced.

Records are of major importance in order to present the facts in any foundry, and a permanent record of all test data should be kept for reference so that casting losses may be constantly checked even after they have been shipped to the machine shop. A complete, clear and concise set of records of each day's operations, correctly compiled and properly interpreted, should be required.

Inspection should not be considered merely as a means for accepting and rejecting individual lots of castings, but also as a means for making adjustments in the process itself. It is true, the inspection must serve the immediate purpose of disposing of the product at hand, but it also can serve as a basis for action on the process with a view to regulating the quality of the future product.

Supervision Is Important

Proper supervision of the work is extremely important. It should be recognized that the fundamental laws of management—centralized responsibility and authority—are important and have a tremendous influence on the production of quality castings. On the other hand, the proper co-operation between operators and management must be considered seriously in the production of quality castings as well as the co-ordination between the various foundry departments.

A number of tools may be used by the foundryman, metallurgist, chemist and engineer to improve the quality and maintain casting uniformity from the raw materials to the finished product. Some of these include: Sand testing equipment at atmospheric and elevated temperatures; mold testing equipment; chemical analysis; physical testing equipment; spectroscope; magnetic testing; x-ray defraction methods; petrographic microscope, and binocular and metallographic microscope.

In conclusion, it should be repeated that production of quality castings does not begin and end in the cost or estimating department, neither does it begin or end merely by writing specifications of the physical and chemical properties of the metal, or by an inspection of the castings. It is the constant vigilance, co-operation, and co-ordination of all operations from the raw material to the finished product which will produce a satisfactory quality casting.

Publishes 1943 Index

American Society for Testing Materials, 260 South Broad street, Philadelphia, just has published its 1943 *Index to A.S.T.M. Standards*. Containing 210 pages the book lists all the society's standards and tentative standards according to subject, and also by numeric designation.

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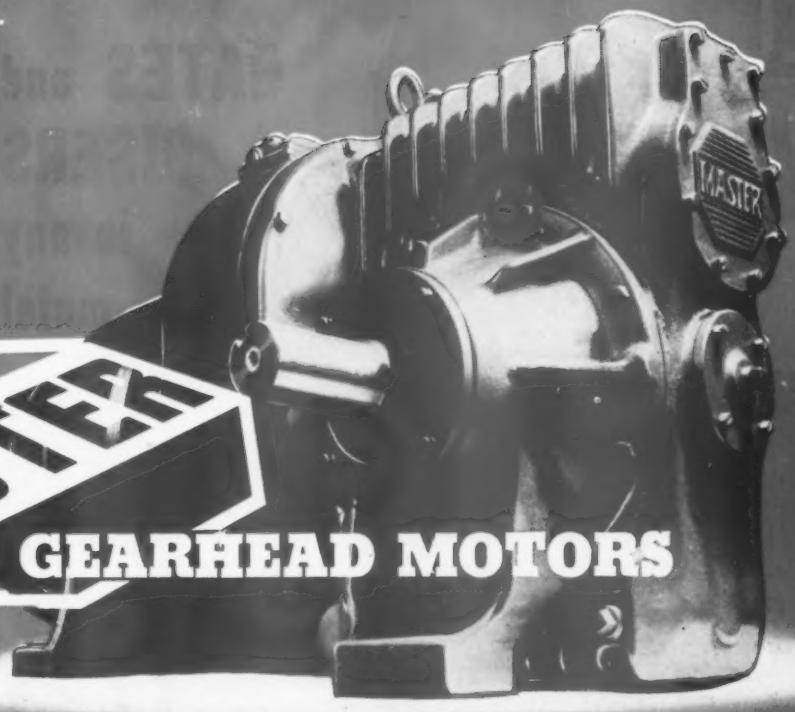
You can secure Master Gearhead Motors for mounting in any position because anti-friction bearings and all-metal lubricant seals are used throughout.



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IMPORTANCE OF DESIGN

Stressed at War Conference

EMPHASIZING closer co-operation between designers and foundrymen, Robert E. Ward, metallurgist, Eclipse Aviation Division, Bendix Aviation Corp., Teterboro, N. J., declared in New York recently that it was the duty of designers to study casting practice and of foundrymen to help designers in such study.

Mr. Ward spoke at a foundry panel meeting held in connection with a War Production Conference sponsored by the Engineering Societies committee on war production at the request of the War Production Board. The panel meeting covered design, application and production of light metal alloys and brass practice and was one of two foundry meetings held during the conference, the other being featured by the following addresses:

"The Centrifugal Casting of Nonferrous Metal," by I. E. Cox, chief engineer, National Bearing Metals Corp., St. Louis; "Centrifugal Casting of Ferrous Metal," by S. D. Moxley, chief engineer and chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.; and "Production and Properties of Gray Cast Iron," by G. L. Richter, metallurgist, Farrel-Birmingham Co., Ansonia, Conn.

J. S. Vanick, metallurgist, International Nickel Co., New York, was chairman, and J. W. Reid, foundry engineer, R. Hoe & Co., Dunellen, N. J., vice chairman of this panel, while A. McIntosh, assistant foundry superintendent, Wright Aeronautical Corp., Paterson, N. J., was chairman, and W. E. Paulson, president, Thomas Paulson & Son Inc., Brooklyn, vice chairman of the other.

A feature of the war production conference was a dinner attended by more than 1300 and at which Capt. Eddie Rickenbacker, president and general manager, Eastern Air Lines Inc., New York, was the principal speaker. The subject was "Production Responsibilities for 1944."

Mr. Ward in his discussion of the design and application of light metal alloy castings, enumerated various points which should be taken into consideration in the design of a casting, emphasizing the need for simplification. There should be as few subdivisions as possible, he said, and no sharp changes in section which invariably would result in shrinkage cracks and distortion. Under-cuts likewise should be avoided.

Favors Simple Cores

He also stressed the need for simple cores. Long, slender cores should be avoided, and there should always be sufficient strength for all cores. Simple cores, he pointed out, can be machine made, and he believes that a foundry should standardize on cores if possible.

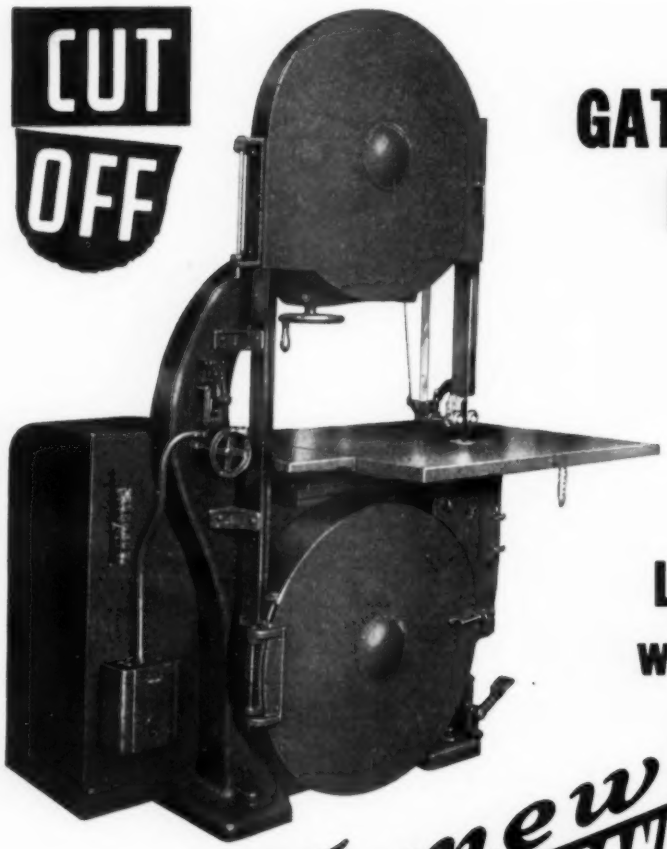
Draft angles should be clearly defined to prevent later interferences; also machine finish allowances. He pointed to the advisability of providing large tolerances for large castings, and warned against using too large fillets which would cause shrinkage. The speaker suggested also that in drawing up a design, it be done so with an eye to the possibility that the casting might eventually be placed on a quantity production basis.

Permanent information should be specified on drawings, such as soundness (in die castings especially), corrosion resistance, pressure tightness, points of stress and x-ray examination. Design which would require molding of large horizontal surfaces should be avoided, he continued.

Design should provide for easy cleaning of patterns, and for marking and lettering in a way that would not hamper gating. Provision should be made for all machine operations and the lifting of heavy parts.

In his discussion of light metal alloy castings, A. Cristello, foundry manager, Eclipse-Pioneer Division, Bendix Avia-

(*Concluded on page* 232)



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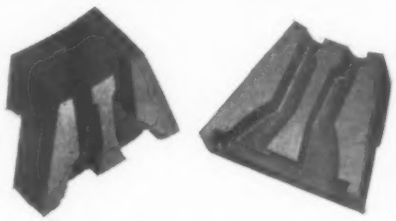
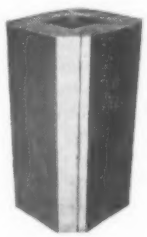
STRENGTH • RESISTANCE TO THERMAL SHOCK • NO CRACKING, SPALLING OR STICKING • FREEDOM FROM INCLUSION • LIGHT WEIGHT • LONG LIFE • LOW COST

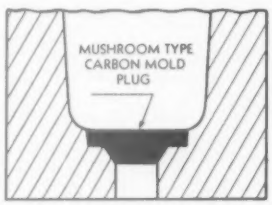


Sections of a machined graphite mold for centrifugal casting of small metal parts

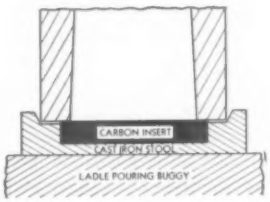


Machined graphite mold

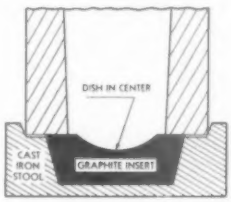
Standard tapered carbon mold plugs available in two sizes. (Other sizes on order)



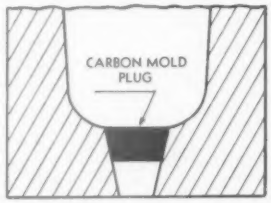
Mushroom type carbon mold plug. Like tapered plug, it replaces ceramics and metal



Showing a machined carbon or graphite slab, used as a stool insert to replace cast iron



Either carbon or graphite stool insert, with dished surface, to replace copper



Another view of standard tapered carbon mold plug, replacing ceramics or metal

MEETING severe requirements—often where difficulties are experienced with other materials—"National" carbon and graphite molds, mold plugs and inserts today are boosting production and lowering costs for a wide range of casting and molding operations in both the ferrous and non-ferrous industries.

Outstanding properties of both carbon and graphite are responsible for these gains. Carbon and graphite resist thermal shock, eliminating spalling and cracking and the possibility of inclusions. They are not "wet" by molten metals. Mechanical strength and original physical shape of carbon and graphite products are maintained up to the highest temperatures involved in casting operations, with negligible thermal expansion. Their light weight and low cost are of paramount importance in many metal casting and molding operations.

The various ingot mold plugs and stool inserts, and the graphite molds shown here are but a few of many carbon and graphite products supplied to the metals and alloys industries by National Carbon Company, Inc. Write today for catalog Section M-8000 listing other applications, along with valuable properties tables of "National" and "Karbate" carbon and graphite materials.

The words "National" and "Karbate" are registered trade-marks of National Carbon Company, Inc.

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NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

CARBON PRODUCTS DIVISION, Cleveland 1, Ohio UCC New York, Pittsburgh, Chicago, San Francisco

(*Concluded from page* 230)

tion Corp., also stressed importance of close working relations between the design engineer and foundryman. It would be good practice, he said, for the design engineer to consult with the foundryman before patterns are built, so that they may agree on some practical design which would facilitate production.

Commenting on the melting of aluminum alloys, Mr. Cristello asserted that all scale should be scraped from the inside of the iron pots and that the pots should then be lime washed and dried before introducing ingots.

Bridging of ingots in the pot, he said, should be avoided. Where bridging is done, he explained, the metal that is already molten will become over-heated, contaminating the whole heat and producing castings with a pin-hole porosity defect. It is good practice, he said, to pour aluminum alloys as low in temperature as possible. Temperature should not exceed 1400 degrees Fahr., although in some cases this can't be helped because temperature has to be exceeded due to design, he said.

With respect to magnesium alloys, the crucibles should be scraped clean and should be aluminum sprayed for longer pot life. Magnesium alloys for sand castings are superheated to 1650 degrees Fahr. to obtain a fine grain size. His company, he said, has found it good practice to pour at as low a temperature as possible.

In discussing molding sand, he said foundrymen must control moisture, green permeability, green compression strength and green shear strength. In the conveyorized foundry, he added, tests should be made periodically, whenever a new batch is mixed, or in the case of a foundry using heap sand, each heap should be tested when mixed.

Molds should be filled where possible through a number of small gates equally spaced, rather than through a few large ones. This type of gate, he explained, insures equal flow of metal, equal cooling and the elimination of possible misruns. A common type of gating practice is to place a ring runner completely around the casting with a number of gates entering uniformly around its circumference.

The speaker suggested the use of large and properly placed risers for feeding heavy sections, and added that iron chills may be used to assist in making heavy sections sound. Chills should be kept clean and free from moisture to minimize scrap loss. He suggested that the face of the chills be painted with a mixture of carbon tetrachloride, paraffine and talc to prevent moisture condensation.

Heat Treatment Is Necessary

Mr. Cristello pointed out that the heat treatment of light metal alloys is necessary to increase physical properties. The intergranular constituent must be absorbed by the crystals to form a solid solution. That is accomplished by holding the alloy at a certain set temperature for a number of hours and cooling. Furnace aging increases the hardness by precipitating certain compounds. Heat treating, he said, adds as much as 50 per cent to the tensile strength, with temperature control very important in this operation.

Discussing procedure at the Bendix plant, he asserted that before patterns are put into production, foundry engineers decide on gating, risers and chills. In gating all areas are measured to suit a particular part. Two sample castings then are made before the pattern is put into production, with one going to the layout department and the other to the x-ray department. When approval is received from both departments the pattern is then put into production. It is his company's practice daily to pick castings at random and send them to the x-ray department so as to make sure there are no internal defects.

The speaker also discussed core sand mixtures and remarked that cores with high strength do not give the collapsibility required for light metal alloys. High core strength causes shrinkages, cracks, etc. Low permeability cores result in blow holes, he also remarked.

R. T. Covington, American Hammered Piston Ring Division, Koppers Co., Baltimore, described with the aid of lantern slides, methods employed by his company in producing quality bronze castings for war work.

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6

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SMOOTH FACES FOR CASTINGS

TAM Zirconite super-refractory mold and core washes produce smoother surfaces and reduce cleaning costs

By resisting the burning-in of the molten metal, TAM Zirconite Mold and Core washes speed up output of good castings by reducing the number and time of cleaning and finishing operations. Available in three grades: Zirconite A has a melting point above 3775° F.; Zirconite B has a melting point above 3600° F.; and Zirconite C, for special uses, has a melting point above 3600° F. They are quickly mixed by adding to water, and can be applied by either spraying, swabbing or painting on cores and molds. Write for complete details, today.

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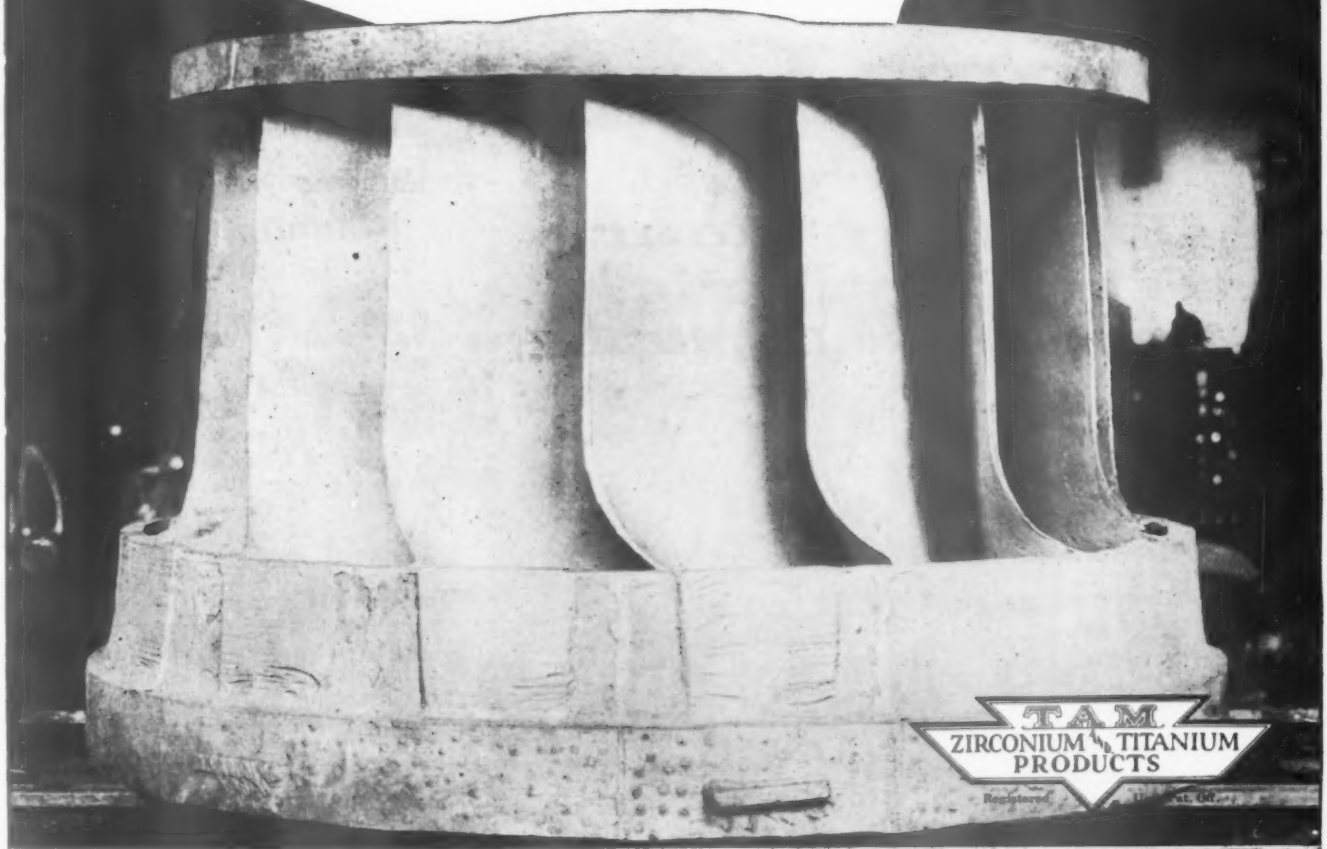
You are cordially invited to visit Booth No. 377 Foundry Exhibit, Buffalo, N. Y., April 25-28.

Zirconite Wash was used on this 94,000 pound .30-.35 carbon steel casting—11'6" high 14' diameter. Of special interest is the fact that no nails were used in the facing.



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A.F.A. AWARDS HONOR FOUR FOUNDRYMEN

(*Concluded from page* 105)

Bucyrus-Erie Co., Milwaukee; the Latrobe Steel Co., Latrobe, Pa.; the American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill.; the Bonney-Floyd Co., Columbus, O., and the Farrell Cheek Steel Co., Sandusky, O.

Mr. Gregg resigned as foundry manager of Farrell Cheek about 12 years ago to join the Whiting Corp. His successful work there led to his appointment as executive engineer of the equipment division. Recently he also was appointed to supervise the company's newly-established electric furnace department.

Mr. Gregg has been an active member of the association, participating in the work of several national committees, including those of both the Steel and Gray Iron Divisions. He has spoken frequently at meetings of the association's various chapters.

Herman E. Alex began his foundry career in 1889 with the Davenport Machine & Foundry Co., Davenport, Iowa. A native of that city, he has spent his entire foundry career in the Quad City area, and since 1892 he has been associated with the Rock Island Arsenal, Rock Island, Ill. Last fall, he was recognized as the oldest ordnance worker in point of service in any government ordnance plant in the United States, having served at that time 52 years. For many years Mr. Alex has participated in the activities of foundrymen in the Quad City area. He is a charter member of the Quad City Foundrymen's Association, now the Quad City Chapter of the A.F.A., and in 1939 he was elected chairman of the chapter.

John Hill is a charter member of the A.F.A., having attended the organization meeting in 1896 as a representative of the S. Obermayer Co., Chicago. Since then he has missed only one national convention. He also attended the first International Foundry Congress in Paris in 1923. Born in Dalton, Ga., in 1863, Mr. Hill worked as a boy of 12 helping in the Dalton Foundry & Machine Co., which was owned and operated by his father, Robert Hill. At the age of 17, he went to Louisville, Ky., to work for the Ainsley & Cochran Foundry Co. After a brief interruption to engage in railroad work he returned to the foundry field, traveling throughout the country to sell foundry facings and supplies. Following 13 years of such activity he formed his own company, the Hill & Griffith Co., Cincinnati. John Hill is widely known among the foundrymen of the United States.

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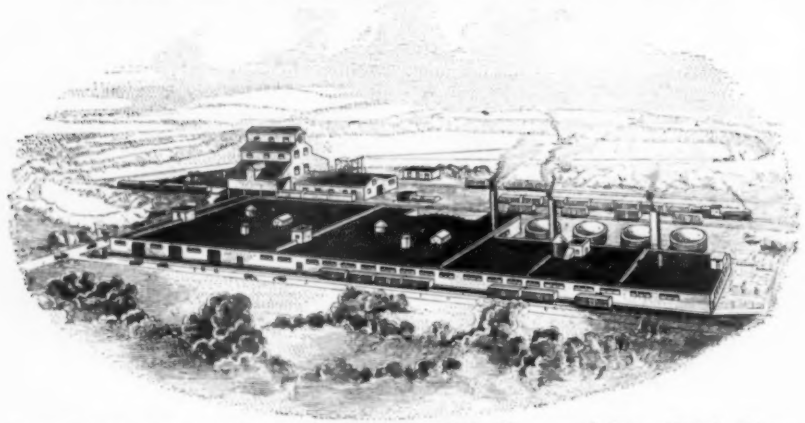
Fire Clay and
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation



Goose Lake Clay Deposit with Clay Grinding and Fire Brick Plant

Illinois Clay Products Company

JOLIET, ILL.

Guides on Postwar Planning Offered

Basic steps involved in the development of a practical postwar planning program are summarized in a six-page folder, "Some A B C's of Postwar Planning," prepared by the Policyholders Service Bureau of the Metropolitan Life Insurance Co., 1 Madison Avenue, New York 10. It is intended as an outline of principles on which to base a postwar planning program. A more comprehensive treatise on this subject is contained in the report, "Planning for Postwar Operations," also issued by Metropolitan. This survey is concerned with practical methods of organizing and conducting postwar activities. Copies of either or both publications are available to executives who address the company on their business stationery.

Heat Treating Films Are Offered

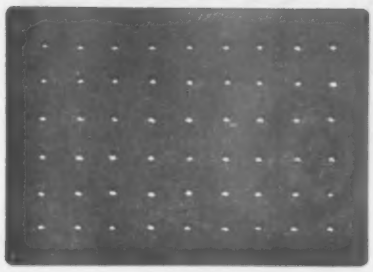
Lindberg Engineering Co., Chicago, is offering two editions of its moving picture "Heat Treating Hints" for showings before groups interested in heat treating shop technique. The films were shown 1212 times before 97,763 persons during the 2 years since their release.

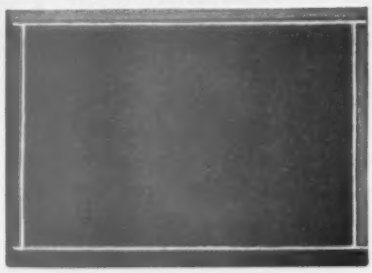
Defective Castings

. . . FROM FAULTY PLATES NEED NOT PLAGUE YOU IF YOU USE

MOLTRUP

FLATTENED STEEL FOUNDRY PLATES





MOLTRUP

MOLTRUP STEEL PRODUCTS COMPANY · BEAVER FALLS, PA.
(PITTSBURGH DISTRICT)

PRODUCES MAGNESIUM CASTINGS

(*Continued from page* 125)

were for a completely mechanized foundry with the molds being made along a conveyor line which transported them to the furnace room where the molds were filled with molten metal. After cooling on the line, the castings were shaken out and flasks returned to the machines on another line. While that plan was followed, demand for castings increased so rapidly that capacity of the conveyor lines and machines soon was insufficient, and it was mandatory that facilities be expanded as quickly as possible. Consequently, since some of the mechanizing equipment was not available at the time, the expansion took the form of the usual foundry floor where the mold is made, poured and shaken out in one place. However, as the equipment situation eased, work began on installation of a conveyorized system, and before long the foundry will be completely mechanized except for one section where extremely large castings are being made.

Melting room is separated from the remainder of the foundry by a brick wall so that all smoke and fumes generated during melting and pouring are confined to that department. Magnesium alloy is melted and superheated in fabricated steel pots in gas-fired furnaces. Primary melting—or holding, as it often is termed—is accomplished in a 1200-pound capacity unit, and from that the molten metal is transferred to any of the two 350-pound, and five 130-pound capacity superheating units. All of the melting units are located under hoods which are attached to a powerful exhaust system.

Temperatures of all melting and superheating furnaces are controlled automatically by recording-controlling devices which in turn are attached to thermocouples inserted in each melting pot. Previous to use, the fabricated steel pots are metallized on the exterior and then a layer of aluminum paint is brushed on. Results obtained by that procedure indicate that life of the pots is increased considerably due to the elimination of scaling.

Covered with a Flux

Procedure in melting is to charge the melting or holding furnace with clean scrap comprised of gates, risers and defective castings, and ingot metal, and cover with a protective flux to prevent burning. The magnesium alloy used is Dow "H" which has a nominal composition of 6 per cent aluminum, 0.15 per cent manganese, 3.0 per cent zinc, and remainder magnesium. Temperature of the furnace is maintained at 1320 degrees Fahr., and the flux used is Dow No. 310. Molten metal from the holding furnace is poured into the smaller superheating crucibles, dusting the stream with flux to prevent burning. The superheating crucibles with their charges are replaced in their furnaces, and covered with Dow No. 310 flux, and the temperature increased to 1300 degrees Fahr. The flux layer is removed and replaced with a fresh layer of flux which is allowed to melt down for about 5 minutes. Then the bath is stirred well for 2 or 3 minutes to insure intimate contact of flux with the metal; thereby wetting the foreign particles and causing them to separate and coalesce. At the conclusion of stirring the flux coating is removed, the molten bath again is covered with flux, and the temperature is raised to 1650 to 1700 degrees Fahr. The metal is held at that temperature from 10 to 15 minutes; the latter being the maximum, and then the crucible is removed from the furnace. Metal is allowed to cool to the pouring temperature which may range from 1300 to 1500 degrees depending upon the section thickness of the casting, and its intricacy.

Molds are made on the bench by hand, and on several different types of molding machines including jolt-rollover, jolt-stripper, portable rollover, and portable jolt-pattern draw-rollover units. Cores also are made by hand and by machine. At this point it might be well

(*Continued on page* 238)

SMOOTH, CLEAN CHILL NAILS
ASSURE SOUND CASTINGS
CAPEWELL
HACK SAW BLADES
Cut Costs and Cut Time . . .
Improved heat treating is responsible for the faster cutting and longer life of Capewell hack saw blades. Hence the saving in production time and costs. Prove these advantages with your own tests.
TECHNITE
Capewell foundry chill nails are smooth, clean and bright — because they are cold rolled from the finest soft iron. They fuse readily. The Capewell line — the most complete — has the right nail for your job. Send for samples.
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CHILL NAILS • HACK SAW BLADES

PURE COPPER, TIN AND SILICON BRONZES

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SOUND CASTINGS

of Optimum Characteristics

when you deoxidize and degasify your molten metal with a

LITHIUM MASTER ALLOY

In molten copper and tin- or silicon-bronzes, Lithium reacts readily with such harmful impurities as gases (hydrogen), oxides, sulfides, or other non-metallic impurities. Owing to its very low specific gravity (1/18 of that of copper) these Lithium compounds rise quickly to the surface. Thanks to its very low equivalent weight, less than 0.01% Lithium is sufficient in most cases.

If you use Lithium in the form of Lithium Master Alloys, you employ copper or bronze as a carrier for the small amount of Lithium needed. Consequently, uniform distribution of Lithium in your melt is accomplished in a very simple manner.

More complete information and directions are available on request. When you write us please state your case so that we can be as specific and helpful as possible.

LITHIUM MASTER ALLOYS ARE STILL SUBJECT TO W.P.B. ALLOCATION

LITHALOYS CORPORATION

444 MADISON AVENUE • NEW YORK, NEW YORK

(*Continued from page 236*)

to describe briefly the various steps in producing castings at Utica Radiator Corp. Drags are placed on the roller conveyor, the cores set, and the molds closed. The molds are moved to the melting room where they are poured and allowed to cool. Then they are pushed to the shakeout. At the shakeout the chills and wires, sand, and castings are separated. The sand goes through a reconditioning unit while the castings are sent to rough inspection. Then the castings are sandblasted, and inspected again. Following that the gates and risers are sawed off, and the castings forwarded to the cleaning and finishing department. After those operations they are inspected again, heat treated, and pickled.

Sand used for molding is the synthetic type composed of a washed silica sand about 55 grain size to which 4 per cent western bentonite, 4 per cent Dow No. 190 inhibitor and 4 per cent water are added. The inhibitor is composed of fluorides, sulphur and boric acid. Moisture content of the molding sand is maintained at 3.5 to 4 per cent on the floor. Analysis of the sand is made once a day to determine whether or not the inhibitors are within the desired limits. This is accomplished by a water soluble analysis. Regular sand analyses for moisture, permeability, strength, etc., are conducted periodically throughout the day.

Following the practice employed in many foundries using synthetic molding sand, the sand forming the cores is the same as that for molding. Due to the low specific gravity and low heat capacity of magnesium and its alloys, the cores must be open, of such constitution that they will disintegrate without difficulty, and at the same time be strong enough to withstand handling and pressure of the metal. Consequently, considerable care is taken in formulating mixtures which will meet almost opposing requirements. At Utica Radiator Corp. two core sand mixtures are used. One, called the jacket mix, is used mainly in cores which are almost entirely surrounded by metal. The other, termed the body mix, is used for all other cores. The jacket mix is comprised of 200 pounds of the washed silica sand, 3 pints resin type core oil, 2 pounds boric acid, 2 pounds sulphur, and 7 per cent water. The body mix contains all the previously mentioned ingredients plus 1 pound cereal binder and 8 pounds fly ash. Cores are baked in batch type, oil-fired ovens.

Heat Treated Electrically

Heat treatment is accomplished in two electrically heated furnaces under closely controlled conditions. In addition to automatic controls for temperature regulation, the furnaces are equipped with devices for regulating the admission of sulphur dioxide gas which varies from 0.3 to 0.45 per cent. From time to time during the day the furnace atmospheres are checked chemically to see that the devices are functioning properly. In addition to the usual furnace controls, 4 thermocouples are located in the castings in different positions in the furnace to check temperature uniformity. Temperature regulating devices on the furnaces operate with precision, and hold the temperature to within plus or minus 5 degrees Fahr.

Advantages of close control of temperatures during heat treatment are shown by the results obtained with the heat test bars which go through with each lot of castings. Tensile strength averages 38,000 pounds per square inch on both solution and aging treatment; yield point on solution treatment averages 14,000 pounds per square inch with an elongation of 10 to 12 per cent, and yield point on aging shows 20,000 pounds per square inch with 4 to 5 per cent elongation. The furnaces have capacities of 1500 pounds, and the solution heat treatment is conducted at 730 degrees Fahr. for 10 hours. Castings then are air cooled, and if they are to be aged, the treatment is conducted at 350 degrees for 18 hours followed by air cooling.

Production of magnesium castings at Utica Radiator Corp. is under close chemical and metallurgical control. Each heat is examined for chemical composition as well as being subjected to determination of physical and mechanical

(*Concluded on page 242*)

KAWIN

SERVICE

LABORATORY SERVICE

CHEMICAL — PHYSICAL

Accuracy, rapidity, and reasonable cost characterize KAWIN FOUNDRY ADVISORY, METALLURGICAL, AND LABORATORY SERVICE. Tests available in unit or agreement basis. We invite inquiries regarding the manner in which this will fit into your operating program. Materials regularly tested for foundry clients are—

IRONS	ALUMINUM	COKE, COAL	MINERALS
STEEL	WHITE METAL	FUEL OIL	SAND
BRASS	BABBITT	FLUXES	CORE OIL

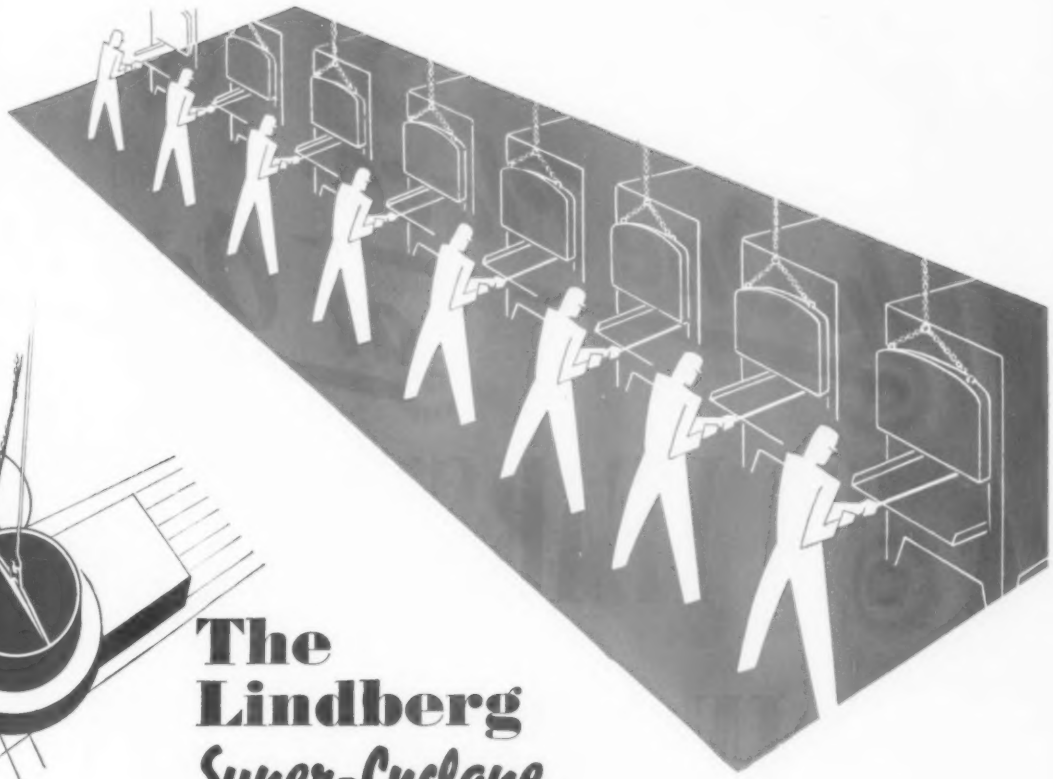
We provide facilities for mailing samples. Reports made by code, wire, telephone, or mail as you wish.

Over 40 years' experience in all types of foundry work. Why not drop us a line and learn how we may serve you by our well rounded organization?

Chas. C. Kawin Company

Chemists—FOUNDRY ENGINEERS—*Metallurgists*

CHICAGO—431 So. Dearborn BUFFALO—110 Pearl St.



*Factual case in large mid-western appliance plant.

The Lindberg *Super-Cyclone* doubled output* *with all this saving in space!*

The principle of forcing hot air through the charge at high velocity gives many advantages to the Lindberg Super-Cyclone Furnace.

Take floor space: For normalizing grey iron castings, one plant loaded them into the basket of a single Super-Cyclone, then heated and dumped, doing the work in 8 hours which had required 8 box type furnaces and 16 hours. *The Super-Cyclone did 12 times the work per square foot of floor space.*

The fan-driven air, pre-heated in an isolated chamber, builds up temperature with rapid uniformity *throughout the charge* to anywhere between 300° and 1750° F., with accurate control. There is no radiant heat to cause distortion.

This revolutionary heating principle keeps work straighter, saves time and space and production costs. Besides, the Super-Cyclone can be used either for normalizing or annealing, for hardening or for tempering.

Write for complete information about this money-saving, time-saving, space-saving furnace, to Lindberg Engineering Company, 2453 W. Hubbard St., Chicago 12.

With the charge confined to a small area, fan-driven hot air at high velocity permeates the entire charge evenly, practically eliminating distortion, saving a great deal of space, and allowing quenching of the entire load without removal from the fixture.

LINDBERG FURNACES

ARMY E NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

In One Place... at One Time...

100 YEARS' EXPERIENCE IN YOUR BUSINESS TO HELP YOU

AT THE 3RD WAR PRODUCTION FOUNDRY CONGRESS

April 25, 26, 27, 28, 1944 — Buffalo, N. Y.

ANOTHER wartime year finds the foundrymen of America with their shoulders to the wheel, turning out the job. Turning it out better . . . and turning it out faster!

Wartime operation has created many new problems and supplied many new answers. This wartime convention will give us all a chance to compare notes and profit by the experience of *all* of us.

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue Cleveland, Ohio

H B Klar

East Central States,
21 years with Osborn

P. E. Kiefer

Middle Western States,
25 years with Osborn

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15 years with Osborn
in the Central Midwest;
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Detroit Automotive Area,
15 years with Osborn

Geo. D. Adam

New England and Eastern
Seaboard,
24 years with Osborn

OSBORN

MOULDING MACHINES

(*Concluded from page 238*)

properties. Specimens are examined microscopically to determine grain size, presence of microshrinkage areas, and to check whether heat treatment has been carried out properly. Numerous fracture tests are made on castings, and a minimum of 5 per cent of the castings are subjected to x-ray examination. Those are conducted essentially to insure that all practices are such that sound castings are produced.

Castings made by the firm cover a wide range in weight, section thickness and intricacy. Various stages of producing an extremely intricate casting are shown in Figs. 2, 3, 4 and 5. This is a rear crankcase of an airplane engine with a poured weight of 90 pounds, and a rough, finished weight of 30 pounds. Some idea of the gating and riser system may be gathered from Fig. 6 showing the first step in removing those portions from the casting. Drag mold is made on a jolt-rollover molding machine, and Fig. 2 shows the appearance after it has been lowered away from the pattern. While not shown clearly, the drag contains a number of chills placed at strategic points to insure directional solidification, and more will be said later in that connection with the cores.

After the pattern is rolled back into position, the drag mold is picked up with a chain-block hoist and placed on the roller conveyor. There it is skin dried and smoked with an acetylene torch. Then the 26 cores shown in Fig. 3 are set. As may be seen some of the cores are in the form of assemblies while others are individual, and they contain numerous projections which interlock. Consequently the cores must be set in the proper sequence, and considerable care must be exercised in their placement. The cores illustrated in Fig. 3 show clearly the widespread use of chills which are the dark inserts in the cores. The casting also contains some stainless steel vanes which are located by the L-shape, chunky core at the center foreground in Fig. 3.

As various cores are set in position, gages are employed to insure accurate location, as indicated in Fig. 4. The gages of aluminum, steel faced, are open box construction to provide stiffness and stability, and are fitted with guide pins which fit into lugs cast integrally with the flask. As may be observed two set screws located at the tops of the lugs permit adjustment of the gage to the proper position without dependence on the top edge of the flask which might become worn or damaged in some way.

Cope mold for the rear case is shown in Fig. 5. As may be observed 8 risers approximately 1 x 4 inches are located around the periphery, and the casting is poured through a double rectangular sprue at one side of the flask. A better idea of the risers and gates may be obtained from Fig. 6. The sprue leads into a runner parallel to the flask side, as may be seen in Fig. 4 in the right background. That runner feeds metal into the two large horn gates located under the circular cores at each end, and also into the upper section of the casting. Gate entrances from the runner into the upper section are not as deep as the runner, and hence the first metal flows into the horn gates filling the casting from the bottom. When the horn gates, casting and runner become filled, the hot metal then flows into the upper portion and risers, and insures presence of hot metal where it is desired most for feeding purposes.

(*To be concluded*)

8 OUT OF 10
are repeat orders

Transite Core Plate Users come back for more!

HERE'S why Johns-Manville Core Plate changes one-time buyers into long-time customers:

Light Weight: Transite Core Plates light weight means easier handling, increased production.

Less Breakage: Their fibrous nature provides unusual shock resistance, minimizes breaking and cracking.

Easily Cleaned: Transite Core Plates are actually self-cleaning when both sides are used alternatively.

Economical: These J-M plates combine low initial price, low handling costs and long life.

Low Warpage: Maximum warpage on plates under 24" is 1/64" on either dimension. On plates over 24", warpage will not exceed 1/64" in 24" length and width.

Corrosion-Resistant: These Transite plates are made of an asbestos and cement combination. They cannot corrode.

Non-Metallic: No critical materials used.

Write for Brochure PP-10A. Johns-Manville, 22 E. 40th St., New York 16, N. Y.

JM Johns-Manville
TRANSITE Core Plates

Two Security Awards Made at Cleveland

C. O. Bartlett & Snow Co. and the Republic Steel Corp. have been selected by the Office of Civilian Defense as the first two Cleveland companies to receive the office's National Security Award. This award recognizes companies which have achieved outstanding programs for safeguarding employes, plants and production against emergencies.

Moves Headquarters

Headquarters of the Aluminum Research Institute have been moved from 308 West Washington street to 111 West Washington street, Chicago 2.

Foundry men use Maehler CORE OVENS for

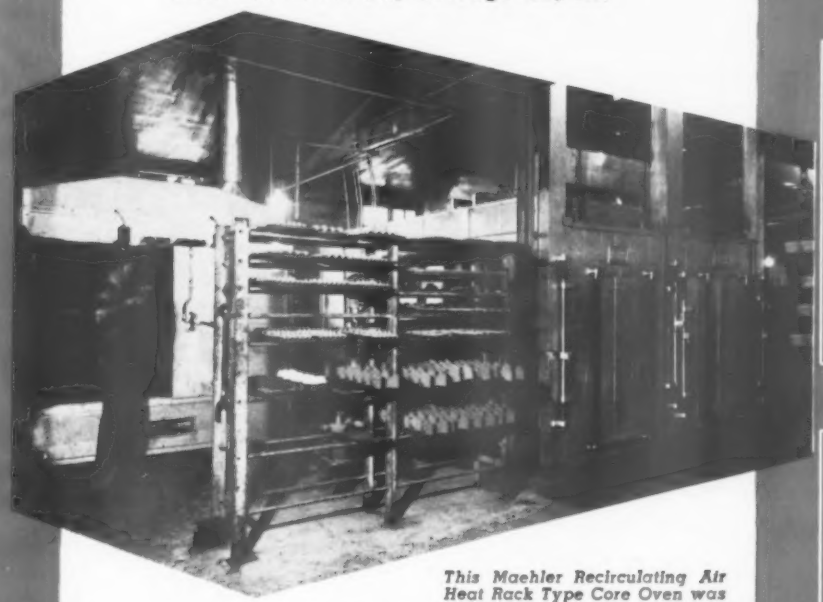
- . . reducing core baking time!
- . . producing more evenly baked cores!
- . . eliminating smoke in the core room!
- . . cutting operating costs!

Foundries equipped with Maehler core and mold ovens are better able to meet today's production schedules and at the same time produce more uniformly baked cores. One of the big advantages of Maehler ovens is the re-circulating air heat principle which assures exceptional heat uniformity. (Recent tests show uniformity within 10° F. in a fully loaded oven operating up to 500° F.) This kind of temperature control means cores that are uniformly baked with no burning.

Maehler core and mold ovens are available in a complete range of oil fired, gas fired and electrically heated units. We are in a position to handle your immediate needs as well as your postwar requirements. Write us today.

THE PAUL MAEHLER COMPANY

2200 W. Lake St., Chicago 22, Ill.



This Maehler Recirculating Air Heat Rack Type Core Oven was installed to replace six brick drawer type ovens at Chambers, Bering & Quinlan, Decatur, Illinois. The success of this installation led to three additional Maehler ovens for this customer.

MAEHLER

Industrial Ovens and Furnaces for Core Baking, Mold Drying, Heat Treating, Enameling, etc.

HERE'S THE EVIDENCE OF MAEHLER CORE OVEN SUPERIORITY

BAKING TIME CUT 65%!

After installing a Maehler Air Heat Oven The Blackmer Pump Co. of Grand Rapids, Michigan reported baking time for small cores reduced 65% —for large cores 30%!

ONE DOES THE WORK OF FIVE!

One double-compartment Maehler Lift Door oven replaced five old core ovens at the Harnischfeger Corporation, Milwaukee, Wisc.

GREATER CAPACITY, LOWER COST!

The Detroit Brass & Malleable Works reported that their Maehler Recirculating Air Heat System on a six compartment metal oven they obtain perfect cores — have increased capacity and lowered costs.

ONE REPLACES FIVE!

One 8' x 8' x 7' Maehler Core Oven replaced five coke heated brick ovens of almost the same size for an owner in Wayne, Michigan.

COLLEGES AND THE MAKING OF CASTINGS

(*Continued from page* 123)

is constructed upon two foundations, scientific data or information, and special competence or skill of a high order. Scientific data and information derive from research; competence and skill, from education and training. The foundryman's answer turns up unmistakable and inescapable. If he really means what he says about hoping to survive and to prosper, he had best attend to research and to education and training after the war—and right now.

American manufacturers and industrialists have taken to research and applied science with some enthusiasm, after lagging hopelessly behind the Germans for more than two generations. The National Resources Planning Board reports that American industries were spending 6 per cent of their net income on research in June, 1941, and in the preceding 2 years had increased the number of researchers in their employ by 41 per cent. The public utility, chemical, petroleum, general machinery, rubber and the electrical communication, machinery, apparatus and supply industries have led the way and, as you might expect, the bulk of research effort has been put forth by the larger institutions: General Motors, Chrysler, Eastman Kodak, Westinghouse, Dupont, General Electric and the like.

The foundry industry is committed to a policy of research, at least (and mostly) in principle. I suspect that the foundries spend less on research, much less, than the average of 6 per cent of net income in American industry. It is true that individual foundry operators, foundry associations and technical schools have completed important researches, particularly in the field of metallurgy, but this has been little more than a nibbling of the edges. Practice in coremaking, gating, venting, pouring, annealing, sand preparation and reclamation, is still largely guesswork, or tenacious adherence to traditional ways of doing things which happen to work out, nobody knows why, and which are recorded nowhere at all, or only in the dog-eared, disreputable notebook of some foreman who has an instinctive but hazy grasp of the scientific method.

And countless investigations might be undertaken in the marketing end of the industry. Are the foundries going to remain forever geared to the machinery business, always to speed up and slow down with that business? Is conventional hardware the only foundry product that can be sold directly to hundreds of thousands of ultimate consumers in Sears Roebuck stores?

Need Education and Training

The second fundamental in the foundry industry, and in every technological industry, is education and training. Only experts can possibly operate such an industry, and the more scientific the industry, the more advanced and comprehensive their training must be. Of course, the foundries cannot get along without the old fashioned molder and coremaker, and foundry apprenticeship will always be indispensable, but we are here talking rather about the scientific control of foundry processes than about the day by day turning out of molds, cores and hot metal.

Scientific control will include the following:

1. Observing the kaleidoscopic shifting of industrial and social events and movements after the war, and quickly planning revisions of policy and procedure accordingly.

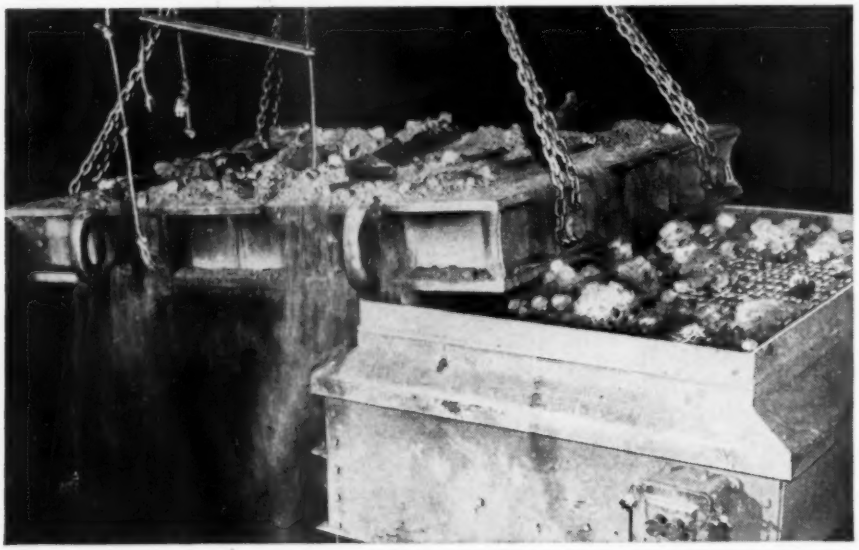
2. Keeping in touch with technical developments, watching the literature, attending schools and lectures.

3. Research work.

4. Installation of instruments, equipment, methods and controls resulting from research.

5: Project work, experimentation, development of new equipment, devices and methods; the sort of thing the regular staff cannot take care of, in addition to getting out daily production.

(*Continued on page* 246)



THE TALK OF THE INDUSTRY
THE SENSATION OF THE SHOW
Robins FLOATEX Shakeouts

The genuinely full-floating principle of the Robins Floatex Shakeout has given the foundry industry an entirely new idea of Shakeout performance, Shakeout efficiency, Shakeout economy.

No more heavy foundations, adding greatly to the initial cost. With the Floatex, the vibrated deck and the superimposed load both ride on heavy-duty coil springs.

No more costly damage to flasks. The Floatex treats them with kindness. At the same time flask maintenance expense takes a sharp drop.

No more cracks in the walls of the foundry — or the surrounding structures. The Floatex shakes the flask—not the building.

Floatex Shakeouts — exclusive with Robins — are made in two styles: Standard for loaded flasks weighing 1 ton to 100 tons or more; Portable for loads up to 17 tons.

On display at the Foundry Show. Explained fully in Bulletin 124-F-4. A copy is yours for the asking.

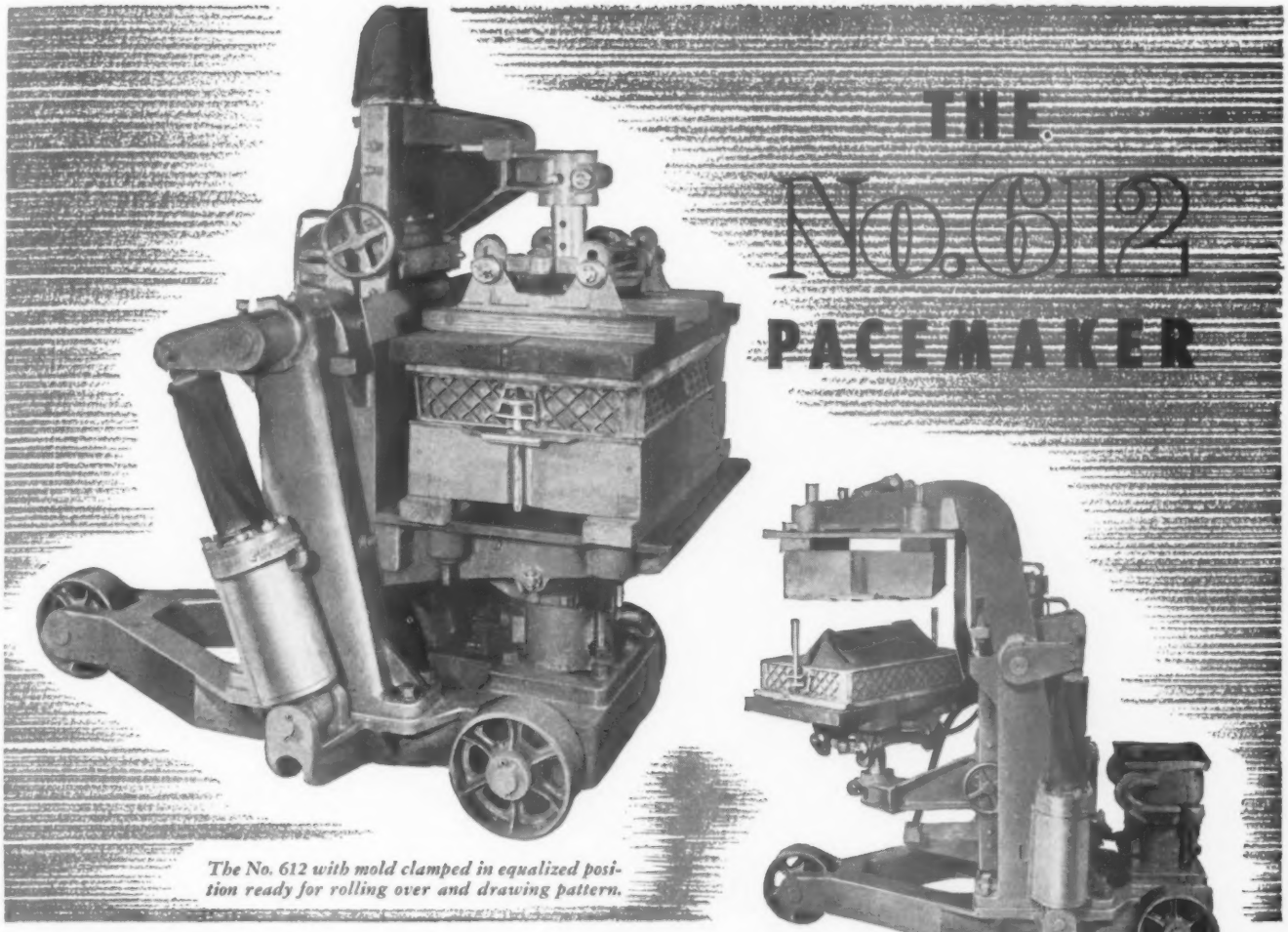
ROBINS *makes:* BELT CONVEYORS • COAL AND ORE BRIDGES • BUCKET ELEVATORS • CAR AND BARGE HAULS • CAR DUMPERS • CAR RETARDERS • CASTINGS • CHUTES • CONVEYOR IDLERS AND PULLEYS • CRUSHERS • FEEDERS • FOUNDRY SHAKEOUTS • GATES • GEARS • GRAB BUCKETS • PIVOTED BUCKET CONVEYORS • VIBRATING SCREENS • SCREEN CLOTH • SELF-UNLOADING BOAT MECHANISMS • SKIP HOISTS • STORAGE AND RECLAIMING MACHINES AND SYSTEMS • TAKEUPS • LOADING AND UNLOADING TOWERS • TRIPPERS • WEIGH LARRIES • WINCHES • WINDLASSES

FOR MATERIAL AID IN MATERIALS HANDLING . . . . . *It's* **ROBINS**

ENGINEERS • MANUFACTURERS • ERECTORS

ROBINS CONVEYORS
INCORPORATED
Founded in 1896 as Robins Conveying Belt Co.
PASSAIC • NEW JERSEY

MATERIALS HANDLING MACHINERY



The No. 612 with mold clamped in equalized position ready for rolling over and drawing pattern.

The No. 612 machine, rolled-over, showing the flask drawn from the pattern.

...For Work Requiring Absolute Accuracy in Ramming and Drawing

★ Newly introduced, this No. 612 portable, jolt, roll-over pattern draw machine is specially designed to meet present day foundry specifications . . . is ideally used in making the intricate cores and molds required in the aircraft and other precision industries.

This machine features an automatic air-operated clamp and equalizer. It is of open-end construction and is easily adjustable for flasks and core boxes of various sizes and heights. The No. 612 has a positive valve-less jolt, free from vibration and rebound, and two roll-over cylinders with oil dash pot control that assures smooth uniform operation.

Our fully descriptive catalog giving complete details of this and other Johnston & Jennings Molding Machines furnished gladly. Send for a copy. . . See you at Buffalo—Booth 164.

THE JOHNSTON AND JENNINGS CO.
867 ADDISON ROAD • CLEVELAND 14, OHIO

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16" draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.

(*Continued from page 244*)

6. Advising superintendents and operating staff concerning utilization of scientific data and results.

7. Search for deficiencies in operation and processes of such long standing and so much a part of the scene that they escape the notice of superintendents and operating staff.

8. Suggesting innovations and improvements, particularly the kind which everybody calls crazy at first. (Fulton's steamboat; the airplane.)

9. A restless, exploratory, discontented, inquisitive, challenging viewpoint, and the imparting of that viewpoint to everybody in the place.

All hail to the self-made foundryman, a magnificent figure of a man. He has been smart, resourceful, courageous. Otherwise he could not have survived. He built the foundry business and has kept it going. Starting from scratch, with nothing except diligence, native intelligence and good judgment, he has worked his way up to run the entire industry.

But he will not be able to carry on alone after the war. He will need the help of experts and technologists in a technically transformed world. And that should not hurt his pride. The ablest executives and administrators will have to depend upon competent technical assistants; indeed, they always have. The lumberman depends upon the forester, the physician depends upon the surgeon and the specialist, the contractor depends upon the civil engineer and General Eisenhower depends upon experts in air warfare, transport, gunnery, engineering and countless other techniques. But getting technical assistance does not reflect upon the general, the contractor, the physician or the lumberman; it is altogether to their credit.

So it is to the credit—and the salvation—of the self-made foundryman that he calls in young technical experts.

The young expert need not take over. The old-timer has a pronounced advantage of him in years of experience and practical know-how. The youngster may be a nuisance in the place in more ways than one, but if the old-timer pooh-poohs the young expert and his technology, he will inevitably pass out of the picture, grumbling and sputtering, but hopelessly and helplessly out of date. It has been ever thus, ever since man has inhabited the earth. The old generation must either catch on to the new or quit. It is a law of the race, harsh but inexorable.

ONE session of the War Production Foundry Congress at Buffalo, scheduled for Wednesday evening, April 26, will be devoted to the subject of "Engineers in the Foundry." A general discussion of the place of the engineer in the foundry will be given by L. J. Fletcher, director of training, Caterpillar Tractor Co., Peoria, Ill. Charles L. Heater, vice president, American Steel Foundries, Chicago, will detail the advantages of employing engineering school graduates in the operating department of foundries.

L. J. FLETCHER

Foundrymen sometimes tell me that "the training problem will take care of itself after the war. Thirty to 90 per cent of men in the Army and Navy are getting technical training, to make them skilled experts and technologists. Millions of them will be coming back to our towns. It will be easy to break them into the foundry game, and they will be glad enough for work to do. They can take care of the highfallutin end of the business."

I am afraid that the foundrymen will be disappointed, and badly, for the following reason. In every technical business or profession there are two classes or groups, the intellectual leaders and overseers on the one hand, and the every-day operators on the other. Thus, there are superintendents of motive power and locomotive engineers, accountants and bookkeepers, designing engineers and draftsmen, surgeons and nurses. Army and Navy training are designed

(*Continued on page 248*)

FOUNDRY BELTS

FOR HEAVY-DUTY JOBS

The Sahara Shake-Out Belt, illustrated Above, Out-Performed Competitive Belts Two to One (Name on Request).

SAHARA—FOR HANDLING HOT SAND

REXALL—FOR CASTINGS & COLD SAND

PREWAR QUALITY—PROMPT DELIVERIES

LET US SEND YOU DESCRIPTIVE LITERATURE . . . WRITE US TODAY.

IMPERIAL BELTING COMPANY

1750 SO. KILBOURN AVE. CHICAGO 23, ILL.

ROURA DUMP HOPPERS

DO THE JOB EASIER, QUICKER, CHEAPER

- If you are looking for a way to shave dollars off your handling and shop distribution costs—right here is your answer.
- The Roura, automatic action, dump hopper is not an untried, fancy gadget—hundreds of them have had tough everyday use in many of the country's best managed plants over the last fifteen years.
- Roura hoppers will simplify and speed up your parts handling, saving both time and money.
- They're designed to fit any standard type lift truck and can be built to handle any kind of material, hot or cold, wet or dry.
- Automatic dumping feature saves tons of heavy lifting and carrying.
- Roura hoppers are sturdy, compact and absolutely safe—built for a long life of everyday service, nothing to get out of order.
- If you are interested in cutting your parts or materials handling costs just send us a letter or a card—We will be glad to send recommendations and prices to fit your needs.

SPECIFICATIONS

- Dimensions: 66" long, 34" wide, 46" high. Capacity: one yard. Hopper built of 3/16" steel plate reinforced with 2 x 2 x 3/16" angle. Electric welded throughout. Stand is built of 1/2" material, sturdily welded and has 12" x 28" opening for lift trucks. Total Weight 700 pounds.

Get the full benefit from your tier lift trucks with Roura self-dumping hoppers

ROURA IRON WORKS 1405 WOODLAND AVENUE DETROIT, MICHIGAN

(*Continued from page* 246)

primarily to qualify soldiers and sailors for duties in operation and maintenance, not for the higher functions of direction and control.

Army and Navy gunners, signal men, radio operators, engine adjusters and airplane pilots know their equipment and they know how to use it and how to keep it in good working order. *But they do not understand the physical sciences well enough to redesign their equipment and revise their techniques in a changing world. They are not engineers.* They will be useful in the foundries after the war but they will have to put in many a long hour of schooling and study before they can take charge of technical foundry supervision.

Now, where will foundrymen get research service and technical experts after the war? They can get them from those institutions whose particular business it is to provide them, the colleges and schools of engineering. Indeed, except for a few independent research institutes, there is no other place to go. After all, the colleges are there, they already exist, and foundrymen might as well make use of them; they will have to pay good money to keep them up in any case.

Foundrymen who wish to recruit the best type of young men in the trying postwar period will have to do business with the colleges because that is where the best type of young men will be. Everybody has been going to college who can afford it, and many who can't. The public expects it. And it is a foregone conclusion, whether you like it or not, that the congress will finance college study for qualified veterans after the war. Of course, not *all* talented young men will be in the colleges, but the others will be so few and so scattered that it will be futile to look for them.

The colleges have always been eager to co-operate with the industries. After the war they will continue to co-operate with the forging industry, the welding industry, the stamping industry, the plastics industry, everybody and anybody. Foundrymen will only be the losers if they hold off because the colleges do have something to offer, a type of technical and engineering service which can be had nowhere else.

Foundrymen Select Too Late

Foundrymen and colleges have fought shy of each other for some reason. Perhaps the foundrymen have not been too happy with the few college boys they did take into their plants. But the best graduates have not gone into the foundries—with many exceptions, of course. Early in spring, late in winter and even in autumn, recruiting officials descend upon the colleges of engineering from the electrical, automotive, aircraft, machinery and more other industries than I can think of. By the middle of March they have signed up all the student leaders and most of the rank and file. And then late in May, when some foundryman finally makes up his mind that he might try a college boy or two, all he can get is the weak sisters. Foundrymen can hardly formulate a fair and adequate opinion about college graduates until they have had a representative sample.

The American people have unbounded confidence in the colleges, and foundrymen might as well go along with their fellow citizens. Examine these data:

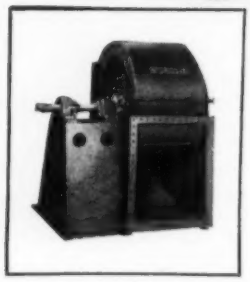
	In 1900	In 1938
Total population in the United States	75,997,575	130,215,000
College students in the United States	237,592	1,350,905

While the population increased by 71 per cent, the college students increased by 470 per cent. It must be that the colleges deliver the goods! The colleges and universities are firmly established in the United States. They are "big business", if that makes any difference, as the following will indicate:

Comparative Annual Operating Expenditures	
American gray iron and "semi-steel" foundry industry in 1939, *including* raw material	$209,719,754
American steel foundry industry in 1939, *including* raw material	120,432,050
American institutions of higher learning in 1938, *exclusive* (of course) of raw materials	475,191,638

But that is not the whole story. We Americans do not invest our hard-earned

(*Continued on page* 250)



...because our Sturtevant Silentvanes handle air more efficiently —on less power!

WATCH THE AMMETER on any oven equipped with a Sturtevant Silentvane Fan. *It's always way down*...because it gives you better than 80% mechanical efficiency over a wide range operation. Improved wheel design also reduces speeds almost 20%, cuts air turbulance and eliminates dust loading. Especially designed for core ovens, mold drying and heat treating operations, Sturtevant High Temperature Fans have the following additional advantages:

NO-COST SHAFT COOLING: Small heat-slinger fan on main shaft keeps bearings at a safe temperature, adds nothing to the cost of operation.

SMOOTH, TROUBLE-FREE SERVICE: Because of streamlined air flow design of the wheel, heavy steel construction of housing.

RANGE OF TEMPERATURES: Select the design best suited to your requirements; standard construction for 400°F, 550°F, 770°F and 900°F; special designs up to 1600°F.

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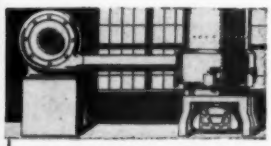
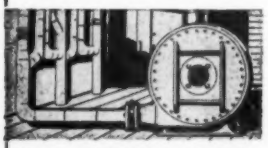
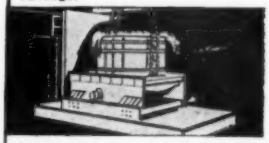


Sturtevant Cupola Blowers—assure smooth, constant pressure supply of air. Compact, simple, sturdy construction; sizes and types for all conditions.



Sturtevant Compressors—hold air pressure constant, in supplying blast to oil or coke burners. Lifetime efficiency, minimum maintenance; worthwhile power savings.



Sturtevant Foundry Shake-out Systems—completely control dust and fumes, increase worker efficiency and equipment life, cut down maintenance.

Sturtevant Dust Control—pioneer experience in engineered systems for collecting dust from snagging, tumbling and sand-blasting operations.

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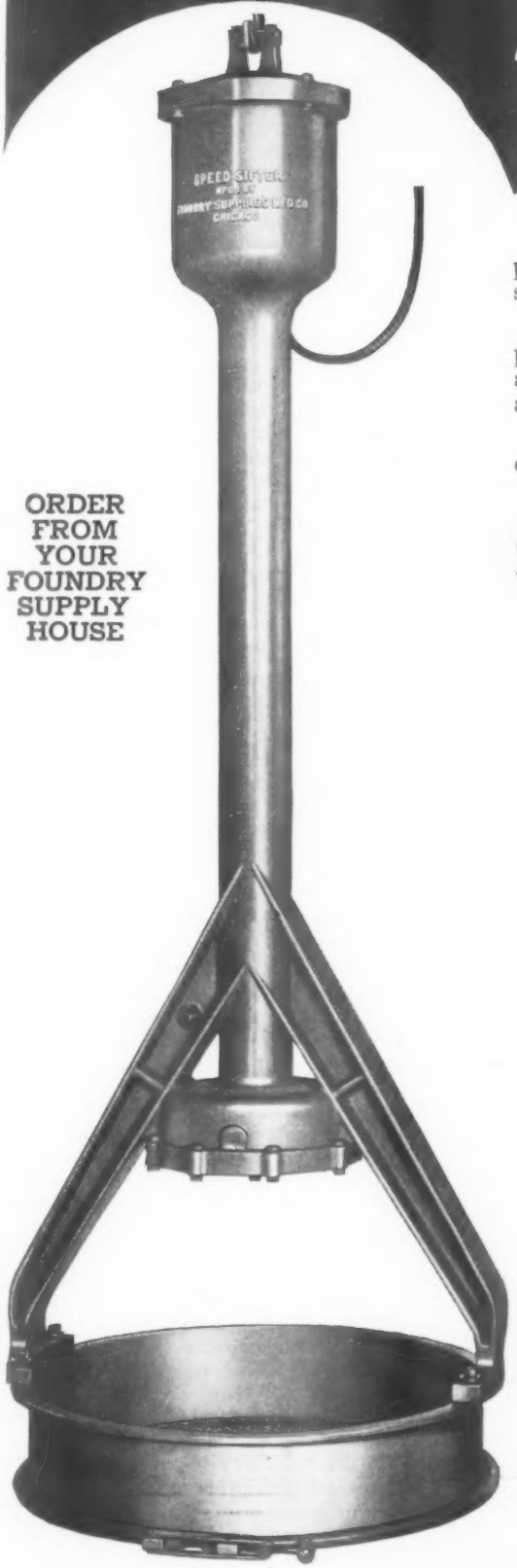
"Hard-to-Please" Foundries Standardize on Rotoplane!



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Try ROTOPLANE in your plant. You, too, will find it increases production, does *all* your sifting more quickly and economically. One size and type for all sifting jobs.

ROTOPLANE is built for long, dependable service. Strong, one-piece frame gives remarkably effective vibration. Smooth, free, rotary action. All mechanism completely enclosed and dustproof. Weight approx. 90 lbs., 62 in. high overall.

Steel-mounted sieves instantly interchangeable. No jagged screen edges, no storage problem. 20 in. diameter clear sifting area.

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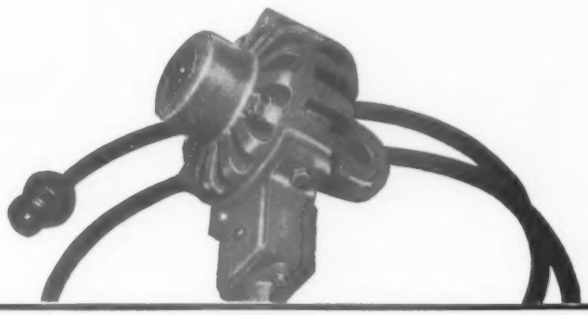
$175.00 f.o.b. Chicago — complete with cable, safety ground wire, one sieve (2-4 mesh). Standard ⅓ h.p. motor, 115-230 volts 60 cycle single phase.
Prices with other motors quoted on request.



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True-to-pattern castings make satisfied customers . . . more repeat business. Increase your production and castings quality with RED Electric Vibrators. Sturdy, dustproof, lowest operating cost (electricity does not freeze). Unequaled for consistent year-'round results in foundries all over the world.

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No. 1—Light match plate work..... $10.00	No. 5—Heavy match plate, tub, bench $17.00
No. 2—Medium match plate 13.00	No. 9—Machine and heavier 24.00

FOUNDRY SUPPLIES MANUFACTURING CO.

2221 Orchard Street Chicago, Illinois

CABLE ADDRESS: "ROTOPLANE CHICAGO"

(*Continued from page* 248)

money in an enterprise unless we believe in it. But the American people have invested in the buildings, grounds, equipment and endowment of colleges and universities a grand total of $4,277,915,707. That is an immense investment even in these days of millions for this and millions for that, and constitutes an overwhelming vote of confidence in college education. The utterly unlimited character of this confidence is apparent from the fact that all the colleges and universities are non-profit institutions and the people will never collect a cent of dividend and they know it, and knew it when they invested their money. The people have made this investment only because they agree with Henry J. Kaiser who urges that our "institutions of learning . . . be sustained, . . . life-giving research be pursued. Without the means to train and develop scientists, engineers, physicians, technicians, organizers and managers, our civilization would collapse."

American confidence in the colleges can be no mistake. You cannot fool all the people. That principle is the basis of our democratic government and institutions. If that principle is wrong we had better arrange with Mr. Hitler, or some of his friends, to come in and run the country for us as soon as he is out of work in devastated Europe.

Time and again a foundryman says, "This whole thing would be easy if I only knew. . . . If I could only get data about. . . ." He needs to find out; that is, he needs research service, and the colleges will gladly work with him after the war—and now. From long experience the colleges know their part in that kind of co-operative undertaking. The foundryman's part is about as follows:

1. He may go to the college and arrange for work to be done there for the solution of single problems and difficulties.
2. He may arrange for a college faculty member to work in his plant on a part-time basis for some weeks or months in order to study and report on some problem which can be investigated only in the shop.
3. He may contract with the college faculty for a continuing service on a succession of problems.
4. Several smaller foundries may jointly engage college men to solve a problem in which all are interested.
5. Work may be performed either under a consulting plan, or by researchers or advanced students on a fellowship or scholarship basis.
6. The foundryman must remain constantly aware that individual research projects do not always result successfully, but that a sound and consistent research policy and program inevitably will produce abundant results, sometimes in most unexpected and inspiring discoveries.

Colleges Are Willing

The colleges will be just as willing after the war—and now—to prepare engineering graduates for the foundry. The colleges know how to do this work from long experience with other industries. The foundryman can help by the following:

1. He will need to determine in advance the purpose of his college recruiting program; that is, just what duties and responsibilities in his organization are to be laid on the technically trained man, and how the technical man and his work are to be co-ordinated with the remainder of the organization.
2. He will need to select his graduates very carefully, preferably by visiting the colleges and making personal contact with them. College personnel officials will willingly help him in his task.
3. He will need to lay out in advance, formally and on paper, a thoughtfully designed program of training operations in his plant in order to enable the young engineer to have a maximum of effective experience in the shortest possible time.
4. He will need to keep close to the graduate, discuss his problems and his progress with him, advise him in his personal difficulties, keep record of his accomplishments and deficiencies, and in every way take a *personal* interest in him.

(*Concluded on page* 252)

Center Scope Brings Optical Precision to Machine Shop Operations

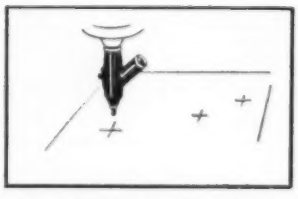
The Center Scope is an optical centering and locating tool that can be easily and quickly used on any machine to center work reference lines to a spindle axis. It permits accuracy to a degree never before obtainable, as the optical beam or line of sight is absolutely inflexible and cannot be distorted.

The Center Scope's easy accuracy eliminates many human errors, as the operator can see just what the cutting tool will do before it is actually fed into the work. It increases production, improves efficiency and prevents spoilage. There is no pressure on the work piece nor is it subject to wear or changes in temperature—for the Center Scope never touches the layout.

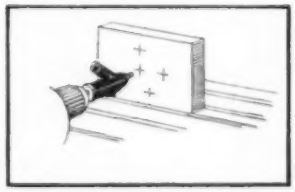
The Center Scope enables the operator to easily and quickly locate edges to a spindle axis, set-up faster and compensate for run-out. It saves vital hours in checking, inspecting and measuring when mechanical methods and tools are impossible to use. Its 45 x magnification allows operator to see ".001" and requires no technical knowledge or training to operate.

While there is nothing particularly new or ingenious about Wrigley's Spearmint gum, it is proving useful to millions of people in many new ways. Workers in war plants everywhere have found it helps keep them alert and relieves nervous tension and dry mouth while they are on the job.

You can get complete information from the Center Scope Instrument Company, 351 S. LaBrea Ave., Los Angeles, Calif., or Kearney & Trecker Products Corporation, Milwaukee, Wis.



ON A VERTICAL MILL—locating and centering height gauge or size block layouts. Permits jig borer accuracy on more machines.



ON A HORIZONTAL MILL—the ability to center a layout, edge block or rotary table plug while spindle is running. Permits quick and easy set-up for high precision work.

Y-109

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for the FOUNDRY INDUSTRY

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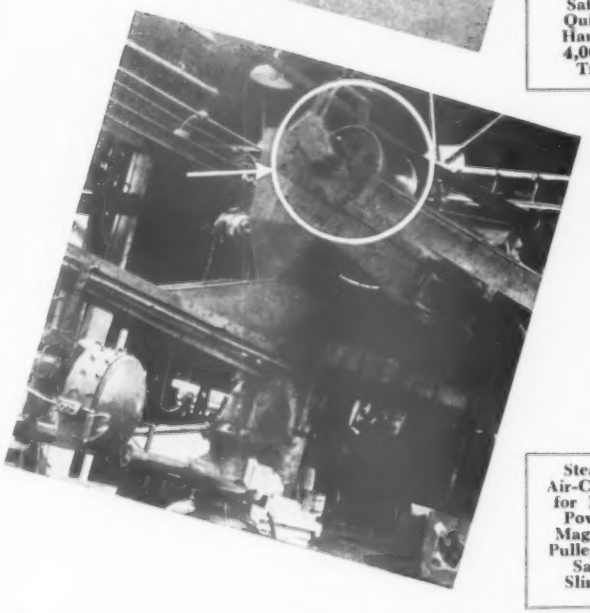

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We are proud to be associated with important industrialists like the American foundrymen and to have Stearns Magnetic equipment specified on so many outstanding foundry operations.

For efficient, automatic and economical aid in sand conditioning and reclamation of metals, Stearns Magnetic Pulleys (air-cooled for more power) magnetic drums and other magnetic separating equipment are producing definitely profitable results in foundry installations everywhere. And there are also Stearns Lifting Magnets for handling heavy castings, moving great quantities of material safely, swiftly, economically; increasing storage capacities, loading and unloading. Made in all sizes and shapes.

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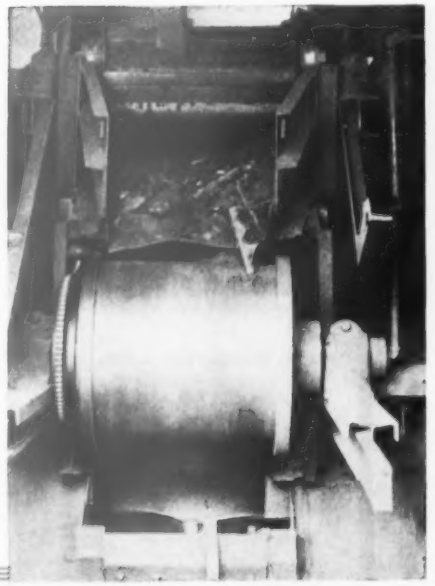

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(*Concluded from page* 250)

5. And finally, the foundryman must —and this is really important—give to the graduate increasingly difficult asignments and greater responsibilities as rapidly as he qualifies for them. The graduate can work successfully only when he knows that he is getting somewhere. Marking time ruins him.

Of course, before they can start any of these ambitious and imposing postwar projects, the foundryman and the college faculty men must get more closely together, must learn to know each other better. A good start has been made in the familiar foundry conferences which have been held at the Massachusetts Institute of Technology, the University of Wisconsin, the Michigan State College and elsewhere. These must be revived by all means. And both foundrymen and colleges should make it their business closely to follow the Committee on Co-operation with Engineering Schools of the American Foundrymen's Association. The committee is an important spearhead in the entire movement.

And maybe, before too many postwar years have passed, the foundry industry will become really scientific, and will achieve all those aspirations that are implied in the slogan on the letter head of the American Foundrymen's Association:

"It's coming; a technical library in every foundry."

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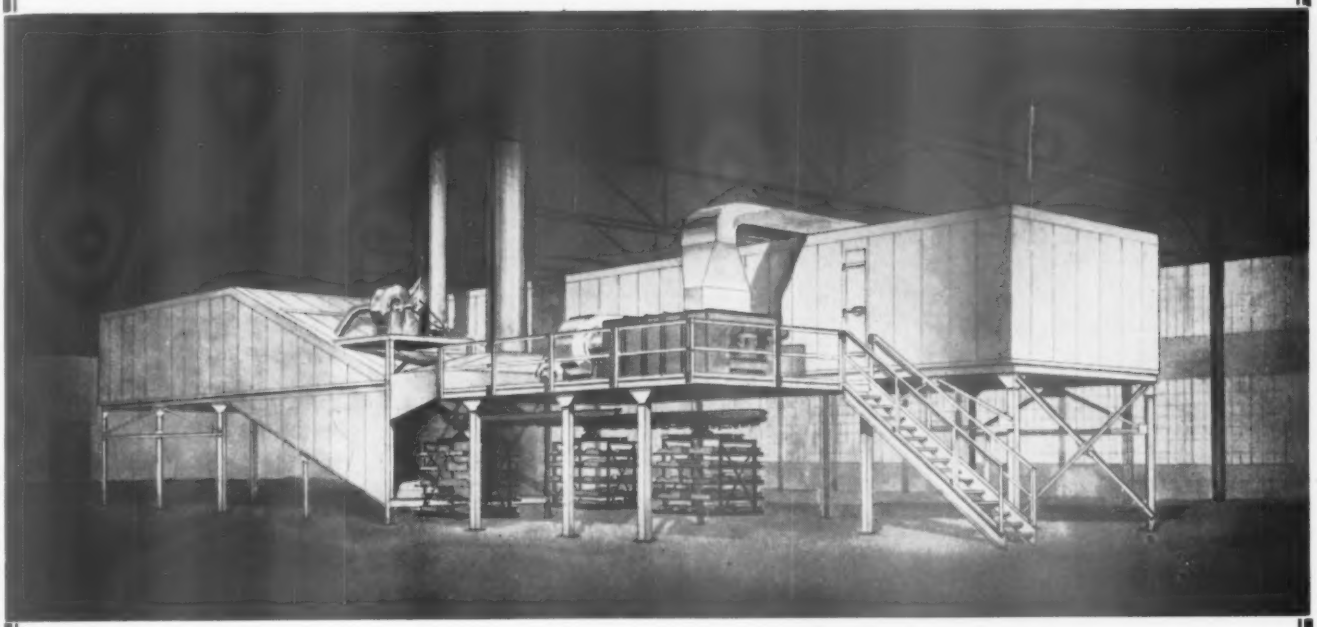
Figures on Machine Settings Compiled

Tables of figures which give machine settings required to obtain various radii, when using an end mill with a smaller radius than that being formed, are being offered by the Awards Branch, War Production Drive Headquarters, WPB, Municipal Center building, Washington 25. In some tables allowance has been made for shrinkage involved in pattern-making. The figures were computed by Chester Velett and John Pfeifauf Jr., Cadillac Motor Car Division, Detroit.

3RD CONTINUOUS MONORAIL CORE OVEN

For Eclipse Aviation . . . Bendix Aviation Corp.



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Experience can't be bought. It has to be acquired. Over 25 years experience in building Core & Mold Ovens. Satisfied customers have benefited from that experience. Many repeat orders indicates the confidence industry's leaders place in Carl Mayer creative engineering and "know-how"!

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To reduce scatter, increase contrast, lessen undercut in radiographs. Picker *quality* lead alloy screens means flawless lead foil, permanently bonded to pliable black bristol.

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In point of *quantity* and *variety* of films stocked, *freshness*, and *promptness* of delivery, Picker Film Service has earned an enviable reputation. All brands, all types . . . all sizes. A dozen or a thousand dozen, promptly, always.

FLEXIBLE FILM HOLDERS
Solve the troublesome problem of radiographing objects with curved contours. Highly flexible even when loaded with screens and films, thoroughly light-tight, and very durable.

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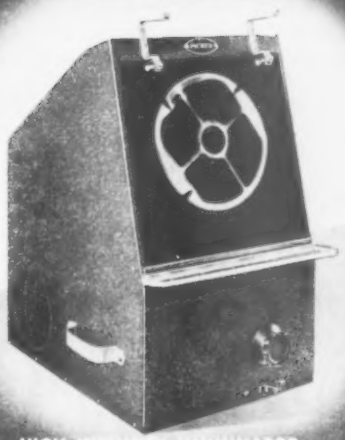

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STRUCTURE CONTROL OF GRAY CAST IRON

(*Continued from page* 133)

This is due to the fact that the lower carbon irons apparently are more susceptible to type *D* formations than higher carbon irons. The tendency toward undesirable structure becomes particularly pronounced below 3 per cent total carbon, even in rather heavy sections. However, irons of a high total carbon content such as 3.4 per cent or more, normally do not show a pronounced tendency toward type *D* graphite formations, except in light sections. For example, the extremely soft iron used in piston rings would not require inoculation if poured into heavy section castings, but it would require inoculation when poured into a section comparable to a piston ring. This fact was illustrated in Fig. 6 (THE FOUNDRY, February).

With few exceptions, the lower carbon irons should be inoculated more heavily than softer irons cast in the same section. To state this another way, the harder, low carbon type irons are more effectively improved by inoculation and the results may be much more striking than in the irons of higher total carbon. This is effectively illustrated in Fig. 5 (THE FOUNDRY, February).

There are a number of factors in the melting practice (including the type of furnace) which affect the tendency of the iron to contain type *D* graphite formations. If the melting practice is consistent, however, it is a simple matter to determine from the microstructure studies how much ladle inoculant is required. It is a mistake to assume that two foundries making the same composition of iron, but having a somewhat different technique, will utilize or require the same amount of ladle inoculant. Melting technique includes all the practices involved in melting, such as type of charge, amount and type of coke, height of coke bed, amount of blast, etc. In the electric furnace, melting technique would include sequence of charging, rate of power input, time of meltdown, and tapping temperature.

Establish Melting Technique

Irons which require a large amount of inoculation have the disadvantage, of course, of being slightly more expensive to produce. On the other hand, irons which require an abnormally large amount of inoculation may readily have unusually high physical properties when correctly treated. The important consideration is to maintain a constant and uniform melting technique so that once the inoculation practice is established it can be made repetitive. It frequently is stated that high percentages of steel in the cupola charge require additional amounts of ladle inoculants for complete inoculation. This theory still lacks complete substantiation. Inherited characteristics frequently are attributed to all the raw materials used in the cupola, but this again has been difficult to prove conclusively. It has been established that inoculation permits the satisfactory melting of a "lower grade" material than normally recommended for best results. There is, of course, a limit to how far the use of "low grade" materials can be carried without the use of excessive amounts of ladle inoculants.

Recent developments in the realm of moisture control of the cupola air supply indicate that the percentage of water in the blast influences the chilling tendency of cast iron. Controlled moisture equipment can be expected to have its influence on the amount of inoculation required.

Recent developments and patents on treated cupola coke are receiving considerable attention since these innovations also will have some influence on this type of iron produced in the cupola, and therefore on the amount and type of inoculant to be used.

It is not the expressed intentions of the authors to complicate this practical presentation of inoculation by a detailed description of the various theories advanced to explain some of the phenomena discussed. To complete the picture,

(*Continued on page* 258)

Reconversion to normal production will entail many changes.

In foundries it may require the repair of overworked ovens—the redesign of outdated equipment—the rearrangement of core and mold ovens—or their removal to new locations.

If such needs develop and your equipment was built by Lanly you'll doubly appreciate the Lanly sectional construction of housings—the flexibility of the heating unit as to application—the durability of parts, equipment and controls.

Lanly is in a position to render expert assistance in any service pertaining to ovens or furnaces for industrial uses. Write for illustrated catalogs and consult us regarding any need that may arise.

THE LANLY CO.
OVENS FOR INDUSTRY
HEATED BY GAS, OIL, ELECTRICITY OR STEAM
750 PROSPECT AVENUE • CLEVELAND, OHIO

Globe..... meets the challenge

Never before in the history of the world has such a challenge to ingenuity and efficiency been placed on Industry's doorstep.

The exacting performance tests given GLOBE'S "H. C." Chilled Shot and Cornered Steel Grit in foundries for the past 36 years, have proven them worthy of the job. Close metallurgical control in production, gives our products the ability to perform with long life and high cleaning efficiency under a wide range of work conditions. GLOBE'S "H. C." Chilled Shot and Cornered Steel Grit will assist you in keeping your production at its peak. Let's win this war fast and with as low a cost as possible!

The GLOBE STEEL ABRASIVE CO.

MANSFIELD, OHIO

(*Continued from page* 256)

the paragraph on "Theory" included in the *Alloy Cast Iron Handbook* of the American Foundrymen's Association is quoted:

"The opinion or Theory is frequently advanced that type *D* graphite occurs when a section of the casting is undercooled. Apparently the temperature at which an iron solidifies determines the size and distribution of the graphite flakes. When an iron solidifies at a temperature near the solidus the flakes are large and randomly distributed. As the temperature of solidification decreases (undercooling) the flakes become smaller and appear in more definite arrangements. At some degree of undercooling the type *D* graphite formation results from solidification. At a slightly greater degree of undercooling, the iron solidifies as white iron. Therefore, the type *D* graphite pattern usually occurs adjacent to a chilled section of the gray iron casting. It is usually found in irons which are most susceptible to undercooling such as irons which have been superheated to high temperatures.

Some investigators have advanced the theory that gray cast irons which contain type *D* graphite solidify in the metastable iron-iron-carbide system as white irons and that the eutectic carbide subsequently decomposes in the solid to form iron and graphite, and that inoculated irons that solidify with a random flake graphite pattern, do so in the stable iron-graphite system, and that the flake graphite forms during the freezing of the graphite austenite eutectic.

It is generally believed that the undercooling of an iron under normal casting conditions is due to a lack of sufficient nuclei to aid in the initiation of solidification and graphitization. The purpose of any inoculant is to artificially nucleate the solidification centers thus preventing undercooling and its attendant type *D* graphite.

Gases May Be Cause

There is evidence that the solution of certain gases such as hydrogen, oxygen, and nitrogen may be responsible for reducing the rate of nucleation during solidification; thereby inducing undercooling. The solution of these gases may be directly responsible for a change in the inherent carbide stability, and thereby affect the size and distribution of graphite. It is not definitely understood whether inoculants achieve their purpose through the elimination of dissolved gas or by supplying nucleating particles which artificiallv promote freezing at higher temperatures nearer the equilibrium solidus temperature."

Inoculation is a process of adding a material to molten gray cast iron in the ladle for the purpose of controlling the structure to an extent not possible by the control of chemical analysis and other normal variables. It has the effect of converting an eutectiform or type D structure to a normal structure containing randomly distributed graphite flakes.

Inoculation is not to be confused with alloying of gray cast iron since they differ in both purpose and metallurgy. Inoculation normally increases the effectiveness of alloying elements and conversely the addition of alloying elements improves the general level of physical properties of inoculated irons.

The presence of type D graphite structures can only be shown conclusively by micrographs. However, these undesirable structures are indicated by high chilling tendency, low tensile strength to brinell hardness ratio, macro-structure, low deflection, and the relationship between the tensile strength and the carbon-equipment.

Type D structures occur most frequently in zones of rapid cooling; normally in the zones of a casting immediately adjacent to the chill surfaces. Therefore, these undesirable structures are most prevalent at the machining or wearing surfaces of the casting where they can be most detrimental.

Inoculation, in general, increases all the mechanical properties, uniformity or reproducibility of properties, uniformity of structure, and wear resistance. It decreases the tendency toward chilling, hard spots, poor machining, and porosity due to nonuniform structure.

The two principal types of inoculants are the stabilizing type and the graphitizing type. The first of these is used principally in the high carbon-equivalent irons or in those cases in which an uninoculated iron would exhibit insufficient density, hardness, or strength in the specific application. The

All New Metal
New Metal and High Purity Scrap
Selected Scrap plus Tin
Scrap
Composition "G" 88-10-0-2 88- 8-0-4 Cu-Sn-Pb-Zn
Commercial "G" 87-10-1-2 87- 8-1-4
Bearing Bronze 80-10-10-0 84- 8- 8-0
Bearing Bronze 83-7- 7-3 80-7-10-3
Ounce Metal or #1 Composition 85-5-5-5
Composition "M" 88- 6-1½-4½ Cu-Sn-Pb-Zn
Valve Composition 81- 3- 7- 9 Cu-Sn-Pb-Zn
Silicon Bronze
Aluminum Bronze
High Strength Manganese Bronze
Leaded Manganese Bronze
Regular Manganese Bronze
Yellow and Naval Brasses 72-1-3-24 69-1-3-28 60-1-1-38

Use These
ALTERNATIVES
Wherever You Can

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

Send for booklet
"INGOT METALS OF TODAY"

•

16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax-Hamilton Gear Bronze
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

THE **AJAX METAL COMPANY**
ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES:
AJAX ELECTRIC FURNACE CORP. Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP. Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP. Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

graphitizing type is recommended for the lower carbon-equivalent irons or those which would normally be too hard in the section of a casting being treated.

The amount of inoculant to be used depends upon the type and application. Less than the recommended amount for any application may be completely ineffective. More than the recommended or required amount may be uneconomical. The graphitizing type material is used primarily in the range of from 0.10 per cent to 0.20 per cent except in those cases in which drastic chill reduction is required, in which case up to 0.50 per cent is used. Less effective materials of that type would, of course, require larger additions. The stabilizing type inoculant is used from 0.50 per cent to 3.00 per cent depending upon the brinell hardness and tensile strength required.

Ladle inoculants may be used for correcting unforeseen discrepancies in chemical analysis although this is not their prime function.

Ladle inoculants may be added to iron either manually in the spout or ladle or by an automatic mechanical dispenser. They should be added to reasonably hot clean metal for maximum effectiveness.

Unusually high melting temperatures and/or low pouring temperatures may require a larger addition of ladle inoculants than with normal practice.

The effect of inoculation begins to disappear after the metal is held in the ladle (subsequent to ladle inoculation) after a period of from 4½ to 30 minutes, depending upon the inoculant used. However, the iron may be reinoculated after this time lapse, if necessary.

Ladle inoculants are most effective and most necessary in the low carbon type cast irons, but are also important and effective in higher carbon irons when poured into light sections or subjected to rapid cooling.

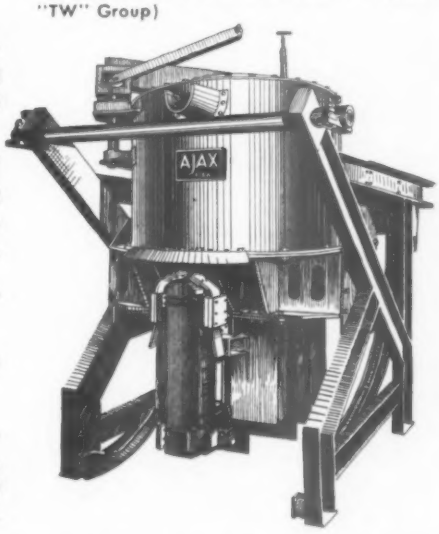
For maximum economy of inoculation, melting technique should be controlled as carefully as possible to ensure consistency since variations in the technique of melting may vary the required amount of inoculant.

Ladle inoculants are not to be considered "magic powders" or "cure-alls", but when judiciously used they provide one of the most useful tools for the production of quality gray iron castings to be developed in the industry.

PLANTS NOW MELTING ALUMINUM ALLOYS ELECTRICALLY ENJOY THESE SPECIFIC ADVANTAGES...

1. **VASTLY INCREASED PHYSICALS** (tensile strength and elongation) in foundry, die-cast, or rolling mill products.
2. **DECREASED GAS ABSORPTION AND SEGREGATIONS** hitherto due to conventional melting practice.
3. **CLEAN-CUT, ACCURATE TEMPERATURE CONTROL** during the melting and pouring stages.
4. **GREAT EASE AND SIMPLICITY IN HANDLING ALLOYS** that were once considered sensitive and difficult to melt.
5. **ELIMINATION** of oxide inclusions.
6. **COOL AND CLEAN** foundry operations.
7. **DELIVERY** of the rated production per hour on the hour, (production capacity 300 lbs. to 1250 lbs. per hour).

This is the first commercial electric furnace for melting aluminum alloys in continuous operation. It utilizes the famous Ajax-Wyatt low-frequency induction melting principle which has been applied successfully for nearly all wrought brass melted throughout the world. Write for new bulletins . . . (The "TW" Group)



AJAX ENGINEERING CORPORATION, Box 1418, Trenton 7, N. J.

THE AJAX TAMA-WYATT INDUCTION MELTING FURNACE

ASSOCIATE COMPANIES:
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AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

Group to Advise on Magnesium Castings

War Production Board has formed a Magnesium Sand Casting Industry Advisory Committee composed of the following members: Wiser Brown, American Magnesium Corp., Cleveland; B. A. Nagelvoort, Renown Stove Co., Owosso, Mich.; Fred A. Foxall, Bendix Aviation Corp., Teterboro, N. J.; Henry M. Reed Jr., American Radiator & Standard Sanitary Corp., Louisville, Ky.; J. R. Could, Springfield Bronze & Aluminum Co., Springfield, Mass.; Samuel J. Walker, Michigan Light Alloys Corp., Chicago; Leo B. Grant, Dow Chemical Co., Midland, Mich.; J. A. Weinman, Los Angeles Magnesium Casting Co., Los Angeles; Lewis Moore Jr., Marshall Stove Co., Lewisburg, Tenn.

Safety Trophy Goes To St. Louis Plant

For establishing the best safety record among all plants of American Car & Foundry Co. the company's St. Louis foundry has won the Stevenson safety trophy in Group 2 for the second consecutive year. It had an accident frequency rate of 3.62 and a severity rate of .17. G. W. Mitsch, as head of the St. Louis foundry, received the trophy from K. N. Searles who acted in behalf of F. A. Stevenson, senior vice president in charge of operations for the American Car & Foundry Co., and for whom the trophy is named.

Receives 13 Awards

Renewal of "E" awards made recently to two plants of Worthington Pump & Machinery Corp. brings to 13 the total number of production citations made to the corporation's various units. Latest plants to be honored are Worthington's Harrison, N. J., works and the Moore Steam Turbine Division, Wellsville, N. Y.

PRODUCING SILICON BRONZE CASTINGS

(*Continued from page* 121)

world, namely, Germany, Japan, and the United States. In this country, the alloys were investigated by Doctors Ray and Gould of the University of Iowa.

It was found that a valuable series of strong, workable, corrosion-resistant alloys can be produced with silicon ranging from 0.50 per cent up to about 6 per cent, with from 1 to about 19 per cent zinc, the remainder copper. Solid, homogeneous alloys, capable of being worked, may be produced with increasing silicon content if the copper in the alloy is increased correspondingly. As silicon is increased, the zinc must be decreased. It was also recognized that small amounts of tin, aluminum, chromium, manganese, and other elements may be present, and that silicon increases the usefulness of the copper-zinc alloys by lowering the melting point, thus enhancing castability. And so these alloys are especially recommended for intricate and thin-section castings. All things considered such alloys have greater tensile strength, hardness, toughness, and elasticity than the common brasses; they are much more resistant to certain corrosive liquids, and castings produced are cleaner and sounder than those made from alloys without the use of silicon.

Keeping these qualities in mind as one considers tin conservation, it is evident that the greatest possibilities for substitution are found in the field of the copper-tin bronzes rather than the high zinc brasses. Hence it is in the copper-tin bronze alloy classifications that present substitutions largely are being made, encouraged by the War Production Board.

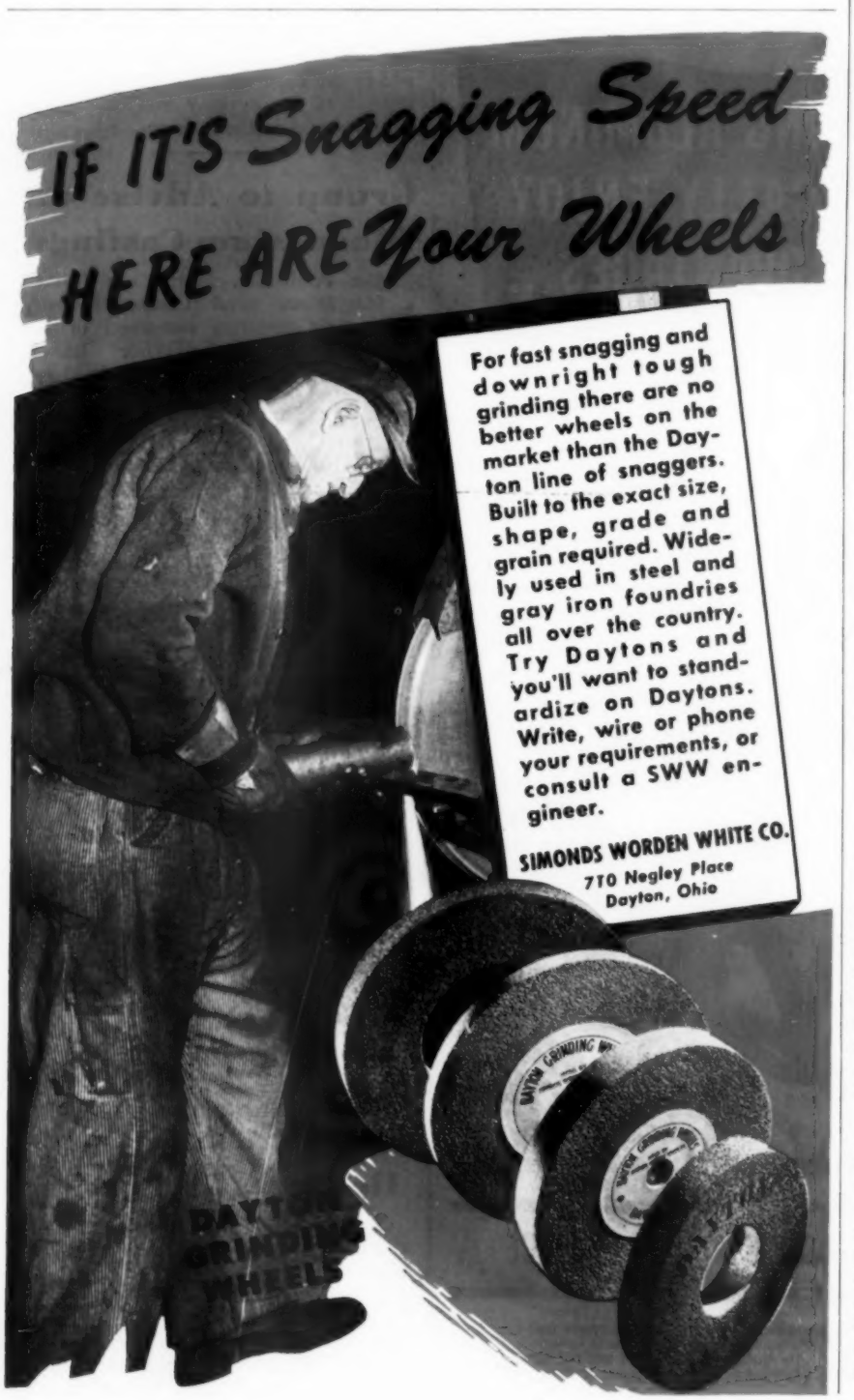
There are three compositions of copper-zinc-silicon alloys in wide usage at present. The first of these is an alloy containing 4.80 per cent silicon, 13.70 per cent zinc, the remainder copper. This alloy has been used successfully for sand castings for the past 10 years. Sand cast test bars produced from this formula give approximately 66,000 pounds per square inch tensile strength, 20 per cent elongation, and a brinell hardness of approximately 140. A second alloy, containing a maximum of 5 per cent silicon and 5 per cent zinc, the remainder copper, represents a more recent development to accord with the U. S. Navy Department specification 46B28 covering copper-silicon alloy castings. This particular alloy, in sand cast test bars, gives approximately 54,000 pounds per square inch tensile strength, 40 per cent elongation, and a brinell hardness of 110. The third useful member of this alloy group contains a small percentage of lead, where machinability is a factor, as for example, for valve stems, spindles, and other similar castings. It has the following composition: 3.80 per cent silicon, 15.50 per cent zinc, ¾ of 1 per cent lead, the remainder copper. Average sand cast values from this alloy are as follows: Tensile strength, 63,000 pounds per square inch, elongation 30 per cent, and brinell hardness 120.

Compare Physical Values

Comparing physical values of these three alloys with the present standard copper-tin bronzes with which we are familiar (Government "G", and Composition "M"), the maximum physical values of which are approximately 45,000 pounds per square inch tensile strength, 35 per cent elongation, and a brinell hardness value of 75, we find that the silicon bronzes have up to 50 per cent greater tensile strength with equal elongation, accompanied by much greater brinell hardness.

In the manufacture of all copper-zinc-silicon bronze alloys a more exacting metallurgical control is required as compared with the standard copper-tin bronzes. This is due largely to extreme variations in the melting point of components, coupled with the fact that the element silicon is all too readily oxidizable under ordinary alloying conditions. Nevertheless, commercial ingot metal, in accord with the three silicon bronze alloy specifications already mentioned, is pro-

(*Continued on page* 262)


IF IT'S Snagging Speed
HERE ARE Your Wheels
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BUFFALO BRAND
"That Dependable Vent Wax"

At a cost of only a few pennies per casting you can use BUFFALO BRAND VENT WAX and make core-blowing and the consequent casting repairs and makeovers a thing of the past. You will eliminate one of the biggest handicaps to delivery on time—a very important item these days.

BUFFALO BRAND VENT WAX vents the most complicated cores thoroughly; cores don't have to be cut-up because of the venting problem; castings can be made in larger units; much pasting of cores, plugging of rod holes, etc., is saved.

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VENT WAX
MEDIUM
WAX FOR
Moderate Weather
NOTICE.
This wax is sensitive to extreme heat and cold.
If too soft, place in a pail of cold water before unwinding, or, if too hard, warm slightly.
ADVISE US OF ANY TROUBLE.
THANK YOU.

A size and shape to fit any type core.

FLAT OVAL TYPE . . . 6 SIZES

This shape is intended for thin flat cores—sizes $\frac{1}{32}$" x $\frac{1}{8}$" to $\frac{1}{4}$" x $\frac{3}{4}$". Provides a proper size vent without giving the core more wax than the sand can easily absorb.

ROUND TYPE . . . 12 SIZES

The round shape with sizes ranging from $\frac{1}{32}$" to $\frac{5}{8}$" diameter permits the correct sized vent for general work.

SEE US AT BOOTH No. 410

UNITED COMPOUND COMPANY, BUFFALO, N.Y.

BUFFALO BRAND
VENT WAX

(*Continued from page* 260)

duced in ever increasing tonnage and successfully used by many foundrymen for castings of various types, some of which will be discussed here.

To deal with the subject from a wholly practical point of view, founders regularly producing castings from these alloys were invited to make representative castings which are portrayed here, together with observations concerning their production. Included are sand cast test bars of various types made for the purpose of obtaining comparative physical properties, and, in addition, some defective castings and test bars which were brought forward for observation.

Attention may be called first to castings known as hose couplings (Fig. 1). In this instance no suggestions were given the foundrymen concerning molding or gating practice. Instructions were issued to the effect that a pattern be selected which was in regular use for the production of red brass or bronze castings which had to withstand some pressure. The object was to determine how silicon bronze would behave when handled under the same conditions as the red brasses or tin bronzes.

In Fig. 1 castings appear just as they were removed from the mold and sandblasted. They were produced from ingots containing a maximum of 5 per cent silicon, 5 per cent zinc, remainder copper. The ingots were melted in an oil-fired crucible lift-out furnace, a small amount of charcoal being placed on the crucible bottom before charging the solid metal. The maximum temperature reached in the furnace was approximately 2150 degrees Fahr. Castings were poured in green sand (Albany No. 1) molds with the sand worked a little on the dry side. Hard ramming was avoided, in line with the same general practice used for aluminum alloys and manganese bronze. Core practice was the same as followed for ordinary red brass alloys, the actual mixture being 50 per cent silica sand, 50 per cent new Albany No. 1, mixed in the proportion of 1 to 50 of linseed oil. In this connection, it has been found that soft cores give best results with silicon bronzes. All castings made from this pattern showed leaks when subjected to 90-pound hydraulic pressure tests. It is interesting to observe that both the runner and gates are entirely in the drag. It was found that virtually all castings leaked at points where the gates were attached.

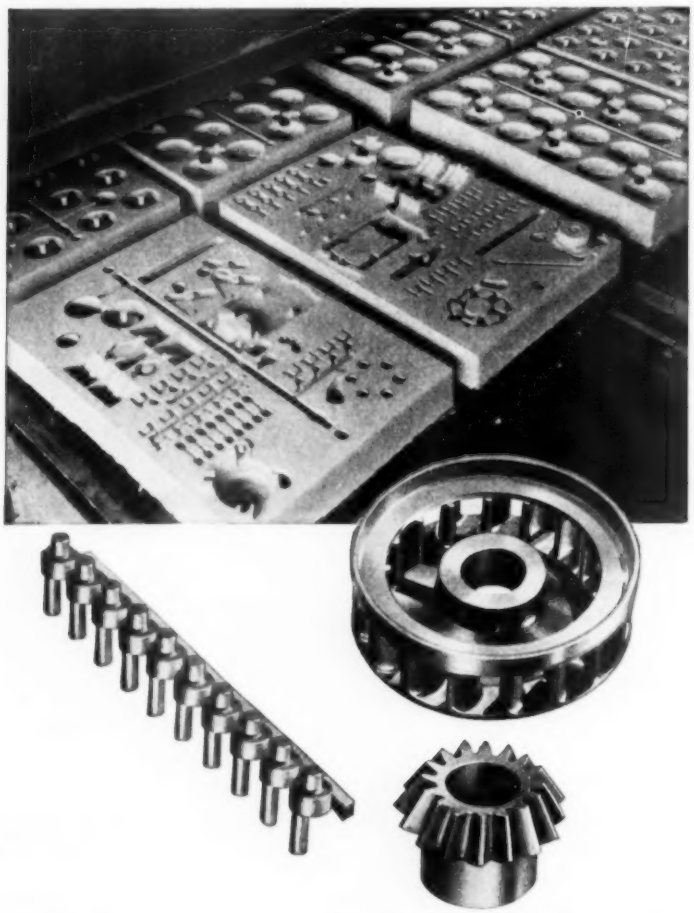
Change Gating System

A gating change was then suggested. Fig. 2 shows a second spray of the hose couplings made after the change in gating, the runner remaining in the drag with gates built up in the cope. All castings produced this way were satisfactory, and they withstood the 90-pound hydraulic test. Several of the castings were then completely machined, and these showed no signs of leaks when subjected to the same hydraulic test. One of the finished hose couplings appears in Fig. 2. It seems clear that this problem was simply one of gating. Final results would seem to show that silicon bronze of this composition may be used successfully for castings of this type. In producing these hose couplings, the melting time was from 50 to 60 minutes for heats weighing 300 pounds. No facing was used on the molds.

Another spray of castings was produced from the same heat of metal used in pouring the hose couplings. These castings, known as "faucet ends", appear in Fig. 3. They comprise components of an oil transfer piping equipment. They must likewise withstand the 90-pound hydraulic pressure tests. The pattern was designed originally for red brass, and, as in the case of the hose couplings, it was selected so as to determine how silicon bronze would react when cast under the same conditions as red brass. All castings made in this fashion developed leaks when put under pressure. However, it was found that the leaks were confined to one section, i.e., the heaviest section remote from the gates.

Here again a change in gating was considered. It involved reversing the position of the castings on the plate pattern and attaching the gates to the heavy section. But the pattern was in constant use for the production of tin-bronze castings, and so this change in gating was

(*Concluded on page* 266)



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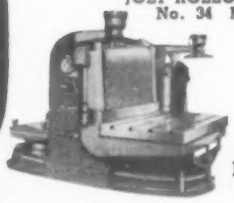
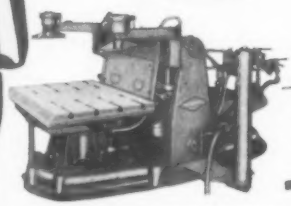
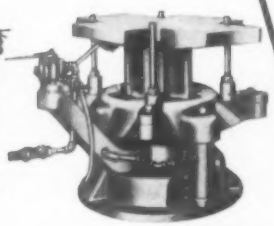


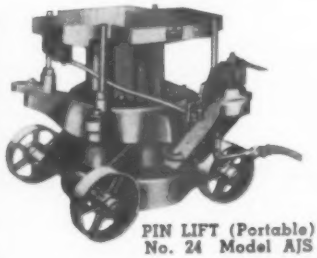
JOLT ROLLOVER DRAW
No. 40 Model A



JOLT ROLLOVER DRAW
No. 34 Model SA



PIN LIFT
No. 24 Model AJS



PIN LIFT (Portable)
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PIN LIFT
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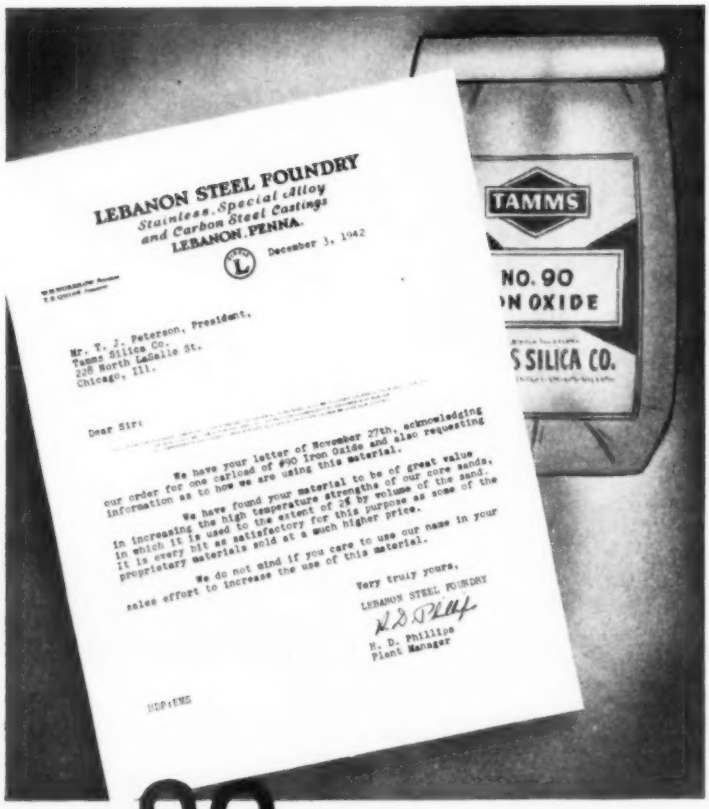
SIMPLIFY FOUNDRY PROBLEMS

for countless firms like yours throughout the country.
Check EACH specialty for benefits it brings to you.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Stainless, Special Alloy
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LEBANON, PENNA.
December 3, 1942
Mr. T. J. Peterson, President,
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228 North LaSalle St.,
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Dear Sir:
We have your letter of November 27th, acknowledging our order for one carload of #90 Iron Oxide and also requesting information as to how we are using this material.
We have found your material to be of great value in increasing the high temperature strengths of our core sands, it is used to the extent of 2% by volume of the sand. It is every bit as satisfactory for this purpose as some of the proprietary materials sold at a much higher price.
We do not mind if you care to use our name in your sales effort to increase the use of this material.
Very truly yours,
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NO. 90
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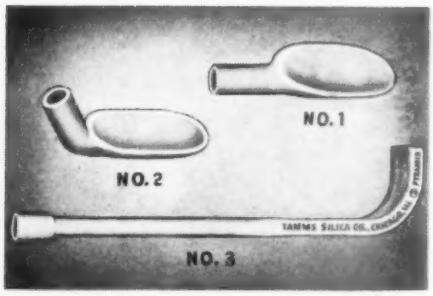
No. 90 IRON OXIDE

Proves invaluable for many foundrymen. Because it prevents core burning, veining, and penetration. The addition of only 2% by volume of No. 90 Iron Oxide to your regular oil core-sand mix prevents core sand failures, improves castings, and reduces cleaning costs. Very inexpensive.



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eliminate metal contamination. Designed and planned scientifically, to meet foundrymen's requirements. They are made of high-heat resisting alloys, and are used for both bronze and brass alloys. Ideal for stirring in flux.

#100 CLEANER FOR CORE BOXES

. . . and core box equipment. Only one *quart* of Tamms #100 cleaner mixed into 5 *gallons* of water makes a solution that soaks equipment and metal patterns clean, *without* injury to metal. Especially dirty or coated parts must soak longer. However, #100 cleaner requires no agitation. Parts are simply soaked, rinsed, and are ready to use.

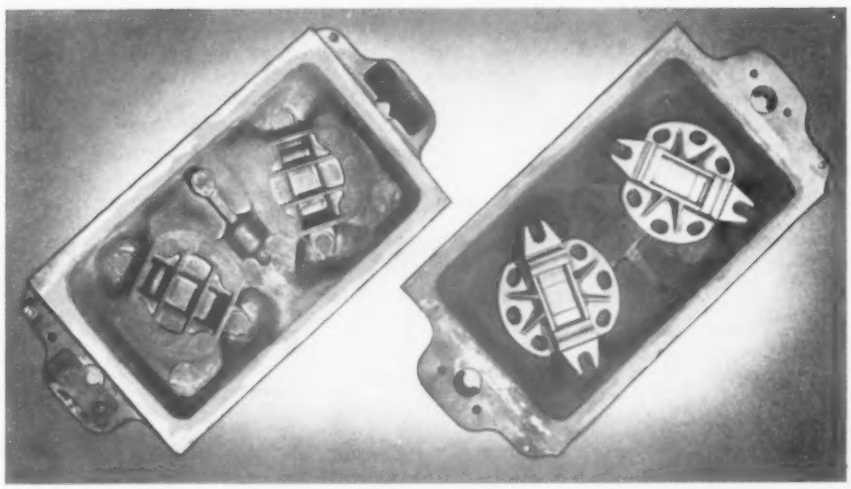
See how SUPER TAMASTONE
Speeds up foundry production as much as 400%

VISIT BOOTH
358-360

for demonstrations, explanations, answers to your questions

See for yourself how easily SUPER TAMASTONE mixes with water, and sets in one hour. Stands calibre checking and maintains true parting lines. Check on its extra smoothness and moisture resistance.

Many foundrymen say these characteristics make TAMASTONE indispensable for match plates, squeezer plates, roll-overs, cope and drag patterns and pattern duplicates. Many leave metal patterns or gated patterns in the drag or cope side of match plates. TAMASTONE needs very little sanding or scraping. And it is so free-flowing, it fills finest detail.



For instance, see the unusual detail of this metal gated pattern converted into a match plate, with the metal gate left in the drag side. (Cope entirely of TAMASTONE). This conversion increased output from 35 castings per day previously to 110 castings per day, an increase in production of over 300%. Cuts costs 68%. (Many jobs show 400% improvement . . . cutting costs 75%).

METALINE, AND PLASTIC METAL FILLER

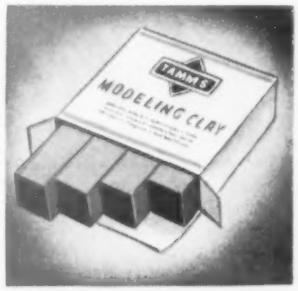
Metaline forms metallic coat over wax fillets, gates or buildups. Prevents sticking of hot sand. Plastic metal fills rough castings, repairs metal patterns.

TAMMS PATTERN SEAL

seals metal, wood or SUPER TAMASTONE, prevents moisture penetration, keeps sand from adhering. Cleaner detail, smoother castings, faster production result. Eliminates need for parting.

TAMMS LIQUID PARTING

sprays on and air dries, to a coat which will not build up on patterns, will not fill detail. Keeps sand from sticking to patterns.



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in standard BLUE . . . also in BLACK, ORANGE, and RED, saves time, speeds production of all metal layout. Machinists, tool and die-makers, sheet-metal men, pattern makers, prefer TAMMS LAYOUT DOPE because it is oil resisting, and quick drying, on brass, aluminum, copper, tin, stainless steel. Won't crack, chip, or flake away. Comes in this handy brush-in can. Also in quarts, gallons, drums. Free Sample on request.

(*Concluded from page 262*)

not permissible. Therefore, it was decided to continue experiments without affecting the pattern, keeping both the runner and gates in the cope, the only change being to build up the runner itself at points where the gates were attached, as seen in Fig. 4. This likewise failed to produce pressure-tight castings, leaks being disclosed precisely where they had been visible before.

A third attempt, shown in Fig. 5 also resulted in failure. In this instance, the gates were simply enlarged by adding additional metal in the drag. Fig. 6 represents the final attempt to solve this problem along the lines clearly indicated. Four loose patterns were molded, one of which was a faucet end, and the foundryman attached risers of prohibitive proportions in his effort to prove the point involved. However, by attaching a riser at the heaviest section of the faucet end a pressure-tight casting was produced at last. It is therefore a reasonable assumption that with proper gating practice pressure-tight castings can be made from this pattern, using silicon bronze alloys.

The group of castings included in Figs. 7, 8, 9 all represent parts of automatic sprinkler equipment. The largest spray of castings (Fig. 8) is known as a water clapper for dry pipe valves. This casting operates under a working pressure of 175 pounds per square inch, and must stand a shop test of 300 pounds water pressure.

The small latch casting and complete spray is part of the assembly, but it is subject only to strength requirements without pressure. For the past 4 years, these castings all have been produced from silicon bronze ingot containing 4.80 per cent silicon, 13.70 per cent zinc, and the remainder copper.

The small spindles and the spray in Fig. 9 also comprise a part of the assembly. These are produced from an alloy containing 3.80 per cent silicon, 15.50 per cent zinc, ¾ of 1 per cent lead, the remainder copper, lead being present to facilitate machining for high speed production requirements. All castings in this automatic sprinkler equipment group were produced from ingot melted in natural draft coal-fired pit furnaces, and poured in green sand molds at a temperature of 1900 degrees Fahr.

(*To be concluded*)

This paper was presented before the Eastern Canada and Newfoundland Chapter of the American Foundrymen's Association, the Pittsburgh Foundrymen's Association and the Connecticut Non-Ferrous Foundrymen's Association.

A.I.M.E. Announces Meeting Dates

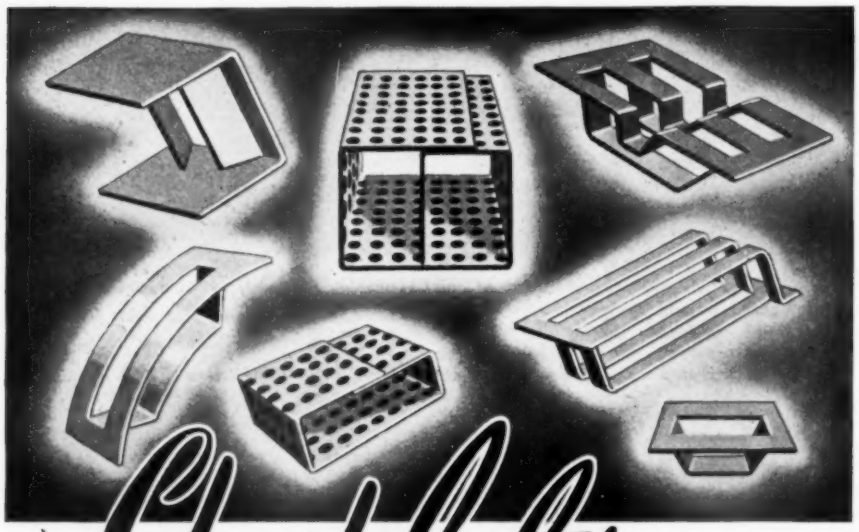
The Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers have scheduled a number of meetings for 1944, including:

Twenty-seventh Annual Conference of the Open-Hearth committee and Blast Furnace and Raw Materials committee, Iron and Steel Division which will be held in Pittsburgh at the William Penn hotel, April 20-21. L. F. Reinartz, American Rolling Mill Co., Middletown, O., is chairman, and Frank T. Sisco, New York, is secretary.

Second Annual Conference of the Electric Furnace Steel committee, Iron and Steel Division, which will be held in Pittsburgh at the William Penn hotel, Oct. 5-6. Charles W. Briggs, Steel Founders' Society of America, Cleveland, is chairman, and Frank T. Sisco is secretary.

Regular Fall Meeting, Iron and Steel Division and Institute of Metals Division, which will be held in Cleveland, Oct. 16, 17 and 18. W. A. Haven, Arthur G. McKee & Co., Cleveland, is chairman of Iron and Steel Division, and Arthur Phillips, Yale University, New Haven, Conn., is chairman, Institute of Metals Division. Frank T. Sisco is secretary of both divisions.

Annual Fall Meeting, Ohio Section of Open Hearth committee and Ohio Valley Section, A. I. M. E. which will be held in Columbus, O., Oct. 27 and 28 at the Deschler-Wallick Hotel. C. R. FonDersmith, American Rolling Mill Co., Middletown, O., is local chairman.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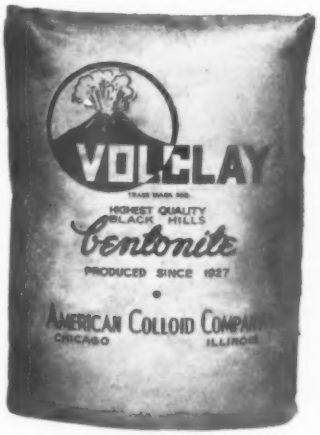
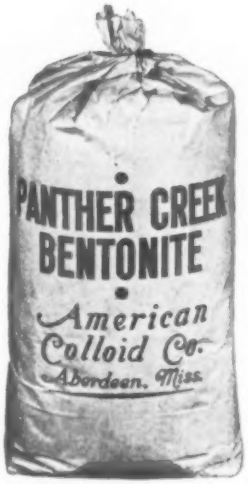
VOLCLAY BENTONITE

NEWS LETTER No. 8

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE



Western Bentonite



Southern Bentonite

WHICH TYPE OF BENTONITE FOR FOUNDRY WORK?

Two types of bentonite are used in bonding foundry molding sand. They are alike in these respects—both yield high green strength with a minimum of clay substance, high permeability and high sintering point, and both peel well.

They differ greatly in dry, hot and baked strength, in collapsibility and in endurance.

Southern bentonite has less dry, baked and hot strength than Western and collapses more readily, hence puts sands in condition to accommodate metal contraction in interior sections and when a thin metal line envelops a section of the mold. It prevents hot cracks and tears in the casting, and the sand shakes out free from lumps.

Western bentonite supplies the dry and hot strength which is a necessary preventative against cutting and washing. Western bentonite is more durable than Southern, and requires less replacement in re-used sand.

As we produce both kinds—Volclay Western Bentonite and Panther Creek Southern Bentonite —we have no reason to say that one is ''better'' than the other. Both are important tools when used in the right places, and combinations can be made to suit every type of condition.

★ ★ ★

More details on the contrast between Southern and Western Bentonite are given on Page 14 of Bulletin 223-C. *Send for it.*

Blends of Volclay and Panther Creek cannot be made at our plants because of geographic location. However, foundries are blending these Bentonites in use, with highly satisfactory results.

VOLCLAY BENTONITE HAS SERVED FOUNDRIES FOR 15 YEARS!

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Producers of Volclay and Panther Creek Bentonite

CASTING BREECH RINGS FOR GUNS

(*Continued from page* 128)

of patterns—metal faced.

Two sandslingers serve the molding area and are supplied from a central system which mechanically handles the sand recovered at the shakeout. Molding sand is an Ottawa type silica sand with an A.F.A. fineness of 53 and is bonded with bentonite and cereal binder. Green compression strength is about 6 pounds, with permeability ranging from 180 to 200, and moisture content held at 3 to 3.5 per cent.

After the copes and drags are rammed on rollover machines, the patterns are drawn and the flasks are shoved over an inclined roller conveyor to a station where a mold wash is applied by spray gun, as shown in Fig. 1. This wash, applied to cores as well as molds, is made up of the following: 1½ gallons of resin oil; 1¼ gallons of kerosene; 7½ pounds of bentonite; 200 pounds of silica; 25 gallons of water. In addition to application of the wash, serial numbers are stamped in the drag, and the molds are vented before the next step of skin drying.

Mold drying is accomplished in a natural gas fired, thermostatically controlled oven approximately 135 feet long and 10 feet wide inside each side. Flasks are pushed from the wash station over a roller conveyor onto a mechanical conveyor leading through the oven, which is divided lengthwise into two sections. Copes move through one section and the drags through the other, with about 2 hours and 40 minutes required for the trip. The oven temperature is held at 400 degrees Fahr.

On emerging from the oven, the cores are set as shown in Fig. 4 and the cope is placed on the drag by a 5-ton traveling jib crane. After the runner cups are built up the complete flask is clamped and set out on the floor for pouring.

The coremaking department along one side of the foundry is conveniently located with respect to the flask assembly floor. Breech ring cores are made both by bench molding and on a blowing machine, and are baked in a tower oven. Composition of the core sand mix includes 720 pounds of Ottawa type silica sand, 100 pounds of silica flour, 24 pounds of clay, 5 quarts of oil and 3 quarts of molasses. Green strength is 5 to 5.5 pounds; dry compression strength 700 to 800 pounds; moisture 6 to 6.5 per cent, and permeability 13 to 20.

Hot metal is obtained from two electric arc furnaces of 20 tons and 6 tons capacity, respectively, which are located at one end of the foundry. The larger furnace is charged by means of a globe-shaped or "orange-peel" type bucket. Segments of the bucket are held in place by a rope while the charge is being loaded, but when the bucket is lowered in the furnace the rope burns away and the segments separate, depositing the charge. The furnace usually is tapped into a 30-ton ladle at 2925 to 2975 degrees Fahr. The pouring temperature ranges from 2750 to 2800 degrees depending on the number of molds to be poured. Time required to pour a 75 mm. breech ring varies up to 25 seconds, and for the 90 mm. size up to 30 seconds.

Castings are allowed to cool in the mold for 6 to 12 hours, depending on their size, after which the flasks are set on the shakeout pile, and the copes are lifted by a crane and swung against other flasks to cause the castings to drop out. After further cooling, the castings are moved to a nearby airless blast chamber through which they are conveyed mechanically in receiving their initial cleaning. The next step consists of cutting off the large feeding heads. This is accomplished either in the foundry by a cutting torch, as shown in Fig. 7, or in the machine shop where heads of the large rings are removed by a circular saw or on a heavy duty roll lathe. The castings then are ground and rough chipped, and normalized in one of several automatically controlled ball type furnaces located alongside the skin-drying oven. A final shot blast follows

(*Concluded on page* 270)

DEMPSEY CHIP and DROSS MELTERS

Recover Primary Metals at 85-95%

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More and more, war producing manufacturers, realizing the necessity for reclaiming scrap in as pure a form as possible, are looking to Dempsey for chip and dross melters which will do this vital job profitably and speedily. Aluminum chips and dross, for example, are being converted into primary metal for the feverishly producing airplane industry at a recovery rate of 85-95%.

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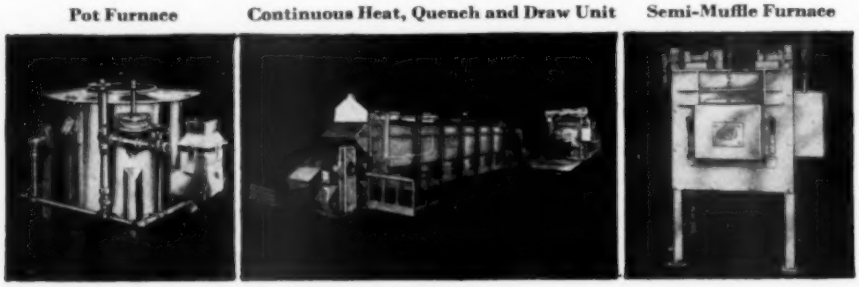

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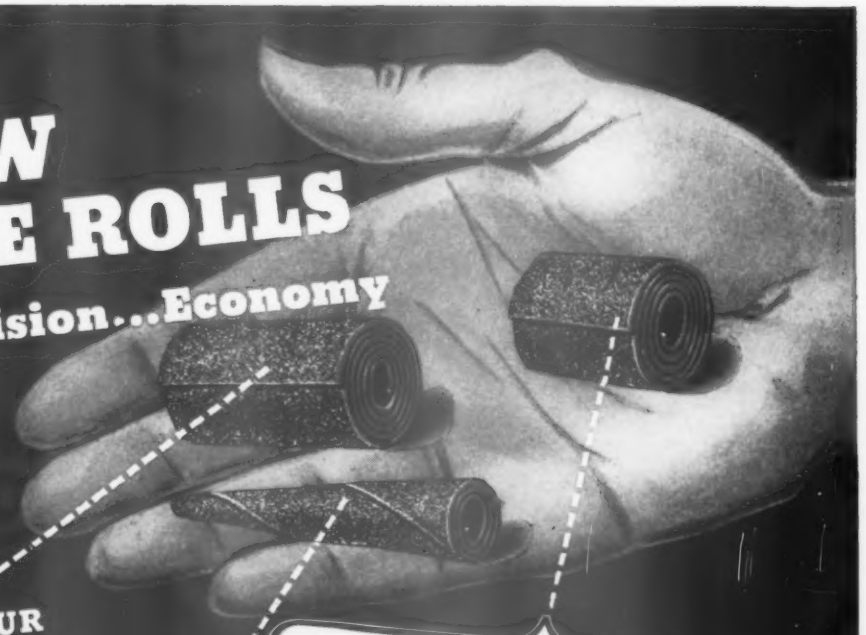

For Fast Deburring

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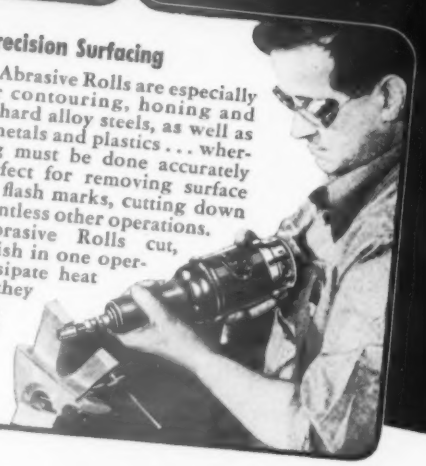
• SKILFLEX Abrasive Rolls are especially efficient for contouring, honing and polishing of hard alloy steels, as well as non-ferrous metals and plastics . . . wherever finishing must be done accurately and fast. Perfect for removing surface irregularities, flash marks, cutting down welds and countless other operations. SKILFLEX Abrasive Rolls cut, shape and polish in one operation . . . dissipate heat faster, so that they run cooler, and prevent metal burns.



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Whenever you need a fast-working abrasive tool to remove metal from difficult recesses in castings or stampings . . . or to grind away tool marks and surface imperfections . . . just attach a SKILFLEX Abrasive Roll to one of your regular electric drills, hand grinders or flexible shaft assemblies *and you've got it!* SKILFLEX Abrasive Rolls go on in seconds, do countless metal surfacing jobs *better* and *quicker* with a *finer finish*—without the need for buying special tools!

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SKILSAW PORTABLE ELECTRIC TOOLS

MAKE AMERICA'S HANDS MORE PRODUCTIVE

(*Concluded from page* 268)

the normalizing, after which the castings are hauled to the machine shop.

Flasks from which the castings have been removed are moved over roller conveyor to the mechanical shakeout to eliminate what sand remains in them, and then are returned to the molding stations. As the sand drops through the shakeout grates it is returned automatically to the central sand preparation system for removal of refuse, and for reconditioning and reuse. Sand which accumulates on the floor when the castings are removed from the flask is pushed by a bulldozer to a grating through which it falls onto a belt conveyor also leading to the central system.

Ohio Steel Foundry Co. does preliminary machining on the breech ring castings before shipping them to the gun manufacturer. This machining removes 15 to 20 per cent of the casting weight and consists principally of boring the ring hole and milling the sides and ends —all to dimensions which require later only a finishing cut on those particular surfaces. The preliminary machining simplifies operations of both the foundry and the gun manufacturer in several respects. It assists the foundry in performing by machine a great deal of the work which otherwise would have to be done by hand chippers and grinders—a type of worker in which a shortage has existed for some time. It aids the gunmaker not only by shortening his machining time but also by eliminating the necessity of laying the castings out by hand prior to machining. Another important reason for the preliminary machining is to have the casting as close as possible to the finished size before the final heat treatment, which consists of heating, water quenching and drawing.

The heat treating department, housed in a separate building, is equipped with roller conveyors and hoists for speedy handling of the castings. Both the heating and continuous draw furnaces are automatically controlled and are fired by natural gas. A cooling system is provided the water quenching units. After heat treatment the castings are passed through a continuous shot blasting unit to remove the scale, and then are given a final inspection including hardness test. Serial and heat numbers are stamped on each ring and the test coupon, cast integral with each casting, is removed.

Breech ring castings are listed by serial and heat numbers on the shipping record. An individual record is maintained for each casting which provides a ready check on composition, properties and treatment of each piece. Special care is taken to see that all castings shipped have the proper serial number, analysis, heat treatment, physical properties, and pattern and heat numbers.

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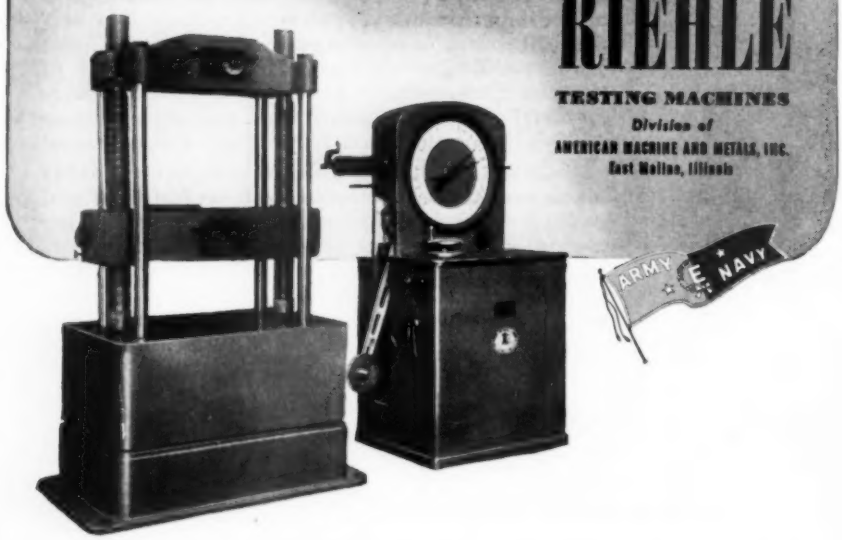
MORE ACCURATE, MORE DEPENDABLE FOR PRODUCTION TESTING because:

Pendulum load indicator operates on the natural laws of gravitation. ...This principle of operation is not affected by temperature changes or subject to metal fatigue....*Write for descriptive literature and quotations.*



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Aluminum Output Up Sharply in 1943

Shipments of all types of aluminum castings during the first 11 months of 1943 totaled nearly 220,000 tons, compared with 162,000 tons in all of 1942, according to a report by the Aluminum and Magnesium Division of WPB. November shipments of 21,600 tons were almost 60 per cent ahead of the 1942 monthly average, compared with an increase of more than 80 per cent in shipments of all aluminum fabricated products. Eleven-months shipments of fabricated products totaled 990,250 tons, against 699,450 tons in all of 1942.

Primary aluminum output in 1943 exceeded 1942 production by more than 75 per cent, totaling 900,000 tons. Peak for the year, and probably for the duration, was reached in the last quarter, averaging more than 92,500 tons per month. Production of secondary aluminum exceeded 250,000 tons last year, reaching a peak of 27,500 tons in December.

Cast Steel in War

"How Steel Castings Are Serving America at War" is the title of an attractive booklet issued recently by the Steel Founders' Society of America, Cleveland. Numerous illustrations show the extent to which steel castings enter in the production of war goods.

Meet us at Buffalo,
Space 63-65

How to "Extend" Manpower and Reduce Costs in your Foundry—2 WAYS

THE skilled men who remain on your payroll must have more help—if you are going to *keep* up on war orders and *catch* up on peacetime business.

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Your nearby E-P Field Engineer will survey your Foundry and help you to:—

1—Transport more tonnage per trip; make trips faster, with one-man crew. With Elwell-Parker Trucks you can speed bigger, heavier loads of *everything:* materials and supplies—castings and parts—finished and assembled units—even ladles of hot metal.

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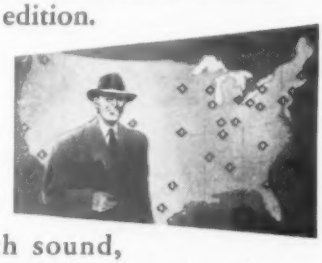

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METALLIC MATERIALS REPORT

(*Continued from page* 132)

to be employed for the parts.

Malleable cast iron is a material in which single blow notched-bar impact tests give figures that do not indicate much toughness. Yet malleable is used in tank track guides and in brackets for 3-inch guns, among many other applications where toughness appears important. Frye[14] illustrates the battering that malleable endures in some ordnance applications. The malleable producers evaluate their product by repeatedly dropping a 21 lb. tup falling 3-1/3 ft., thus producing 70 ft. lb. at each blow, on a wedge 1 inch wide, ½ inch thick at the butt, 1/16 inch thick at the tip, curling it up into shape reminiscent of the dandelion curls the kids make. The test is carried to 30 blows if no crack results, or stopped at the first crack.

A comparison of results from this test and from the regular Charpy notched-bar single blow impact test is shown in Fig. 8 for a regular malleable iron, as received. It's the notch, rather than the impact that is to be avoided.

In spite of having only a fraction of a foot-pound notched bar resistance, zinc-base die castings are used in shock absorbers on Army jeeps. Chase[15] gives in Table II information on *un*notched specimens. To give information on toughness, impact tests on zinc-base die castings are made and reported on ¼ x ¼-inch *un*notched specimens. If engineers had insisted on high ductility and high resistance to impact on a notched-bar and, hence, had disregarded the possibilities of zinc-base die castings, they would have cut themselves off from great savings in production, obtained through the ability of the alloys to be die-cast with very small dimensional tolerance, so small that no machining at all is required on many parts. Aluminum piston alloys and cast iron used for pistons are extremely low in notched impact resistance, yet serve their purpose.

These materials of low notched-bar resistance do not worry the engineer, he knows that they serve excellently when the applied stresses are of the type they will withstand.

Various types of ductile material also cause no worry because their ratio of shear strength to cohesive strength is such that, though they could be made theoretically to act brittle under triaxial stress, the engineer knows that under no condition he needs to impose, do they act in brittle fashion. One of these materials is the austenitic type of stainless and of high-manganese steel.

Resistant at Low Temperature

Wiester[16] states that the chromium-manganese and high manganese types of austenitic steel are as impact resistant at liquid air temperature as the nickel-chromium type.

The increase in tensile and yield strengths at low temperature is characteristic of metals and alloys in general. Copper-base, nickel-base, and aluminum-base alloys retain much or all of their tensile ductility at low temperatures, in spite of the increase in strength. Their notched-bar impact resistance also tends to remain close to the room temperature level. They appear even better materials of construction at low than at normal temperature. Magnesium-base and zinc-base alloys may decrease somewhat in tensile ductility, and the already low notched-bar values may also decrease as the temperature is lowered.

The nonferrous materials, as a class, appear capable of considerable cold-working without becoming temperature-sensitive in tensile ductility or notched impact.

It is the ordinary structural and heat-treatable steels whose response to the type of applied stress, and whose alteration in the ratio of shear strength to cohesive strength through cold-work or through lowering of temperature, result in brittle behavior. The original room temperature ductility and notched-bar impact figures of the ordinary steels are

(*Continued on page* 274)

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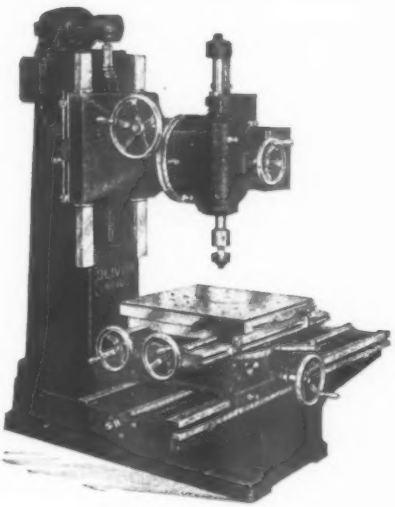

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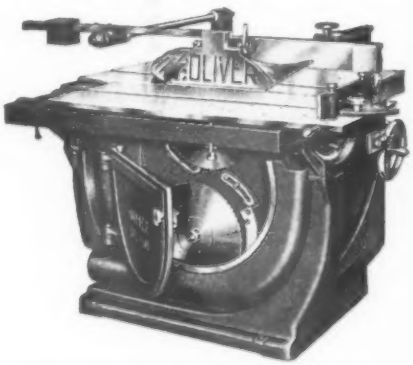

"Oliver" No. 260 Double Arbor Tilting Saw Bench

Is Your Pattern-Shop a quick-change artist?

When new products must be brought out or changes in design are quickly needed—the Pattern Shop is the first step from the "blue print stage" to the Production Line.

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Only a limited number of machine types can be illustrated here, but a wider variety will be shown at the coming Buffalo Convention. Be sure to see our exhibit there or contact our Representative, if you are thinking of adapting or modernizing your pattern shop equipment.

OLIVER MACHINERY CO.

Designers and builders of high-grade woodworking machinery since 1890

GRAND RAPIDS, MICHIGAN

(*Continued from page* 272)

decreased by factors that increase hardness, such as high-carbon content, cold-work, low tempering temperature, after quenching, etc. But the tensile ductility and the notched-bar behavior do not necessarily go down hand in hand as the temperature is lowered. Indeed, the tensile test usually shows almost as much tensile ductility at —240 degrees Fahr. as at room temperature, though at —320 degrees Fahr. it may fall to under 5 per cent elongation or reduction of area, or may continue to remain nearly as high as at room temperature.

A sharp drop in the value returned by the conventional notched-bar test may, however, occur at only moderately low temperature, as is shown in Fig. 5. The sharp drop is accompanied by a change in the appearance of the fracture. On the upper branch of the curve the fracture is a fibrous, tearing one; on the lower, a shiny, brittle one.

The brittle type of fracture may occur in actual *parts* despite a high notched-bar figure for the *material*, tested in the conventional fashion. This is a size effect. The effect of size is indirectly brought out in the work of Epstein.[17]

The effect of size has been commented on by many engineers. Haigh is approvingly quoted by de Forest.[18] "Large notched bars are necessarily brittle, even at ordinary temperatures, no matter how ductile the metal may appear when tested in small sizes." Schuster[19] remarks that we ought to use very large specimens, more comparable with service conditions of large parts. Bailey[19] says that brittle fracture is a consequence of size and form, hence the usual notch-bar test does not measure resistance to the spread of a crack as it would occur in practice, "fails in its own objective, and has no great practical value as a specification test."

A properly finished heat-treatable steel that hardens throughout on quenching, properly quenched, and well tempered back—say to easy machinability—in general is well able to withstand even the lowest atmospheric temperatures met in aircraft operation, pretty much irrespective of its chemical composition. In such steels, proper heat treatment may even swamp out the effect of poor finishing practice. It is in non-heat-treated, as-rolled, or normalized steels that the effect of finishing practice becomes notably paramount.

The strong effect of the practice in finishing an individual heat of steel has been forcefully brought out by Sims and Dahle.[20]

Chemical specifications are never anything more than an indirect means to an end. The hardness secured on quenching a steel is a function of the carbon content and may be specified indirectly by specifying carbon, but it is hardness, not carbon, that the engineer wants.

Specify Low Phosphorus

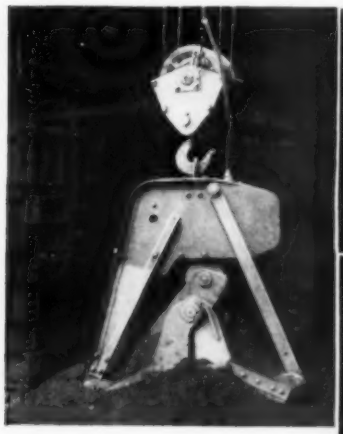
Steel specifications commonly include maximum figures for phosphorus and sulphur, not because the user cares about these elements, but because, in very hard steels—whether made hard by high carbon in nonheat-treated steels or by quenching—the combination of high carbon plus too high phosphorus leads to brittleness at room temperature, a type of brittleness revealed either by tensile ductility or by notched-impact tests.

When the carbon content is low, phosphorus even in double the amount ordinarily permitted, does not embrittle, and is a useful strengthening element. Nevertheless, the fear of phosphorus caused specifications for low-carbon steels to contain quite illogically low limits for phosphorus, until the advent of the mild alloy steels in which phosphorus was recognized "as a tonic rather than a poison", as it has been phrased.

Sulphur in excessive amounts does not produce cold-shortness but does lead to hot-shortness, hence is avoided from the standpoint of avoiding trouble in the mill and foundry. From the user's point of view, sulphur produces inclusions, and it is to avoid these inclusions as much as is feasible that sulphur limits are set. However, the sulphide inclusions aid machinability.

Finding how to *insure* quality and freedom from scatter while the metal is a-borning is a lot more important than how to make chemical and mechanical

(*Continued on page* 278)



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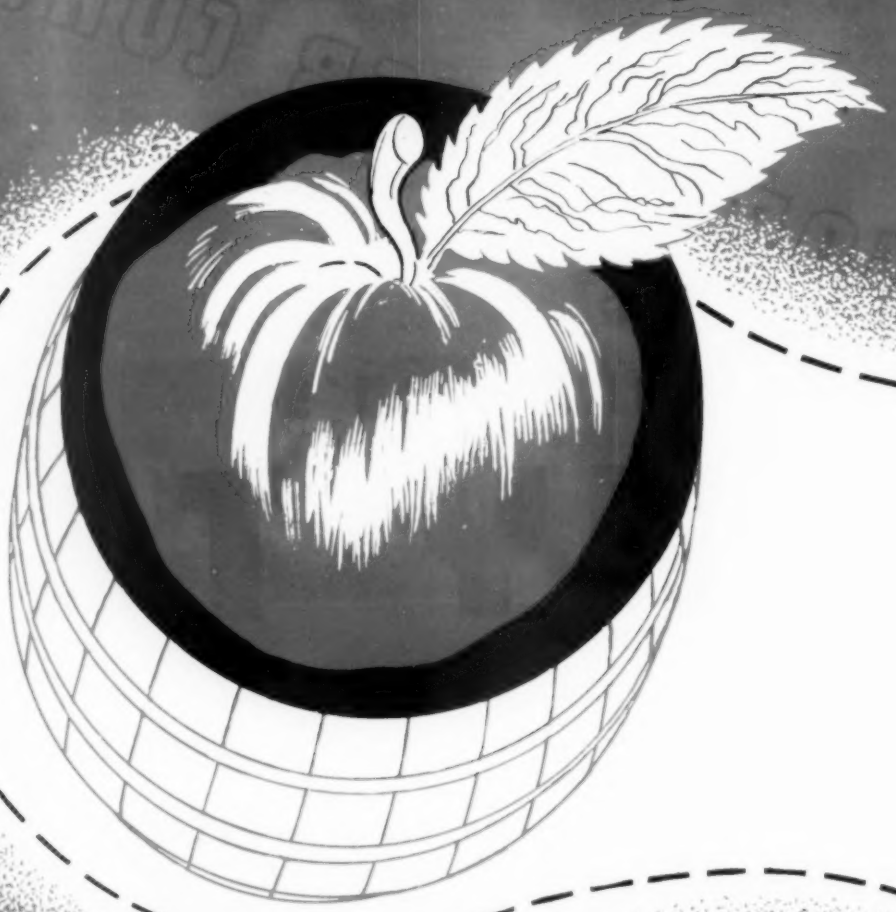
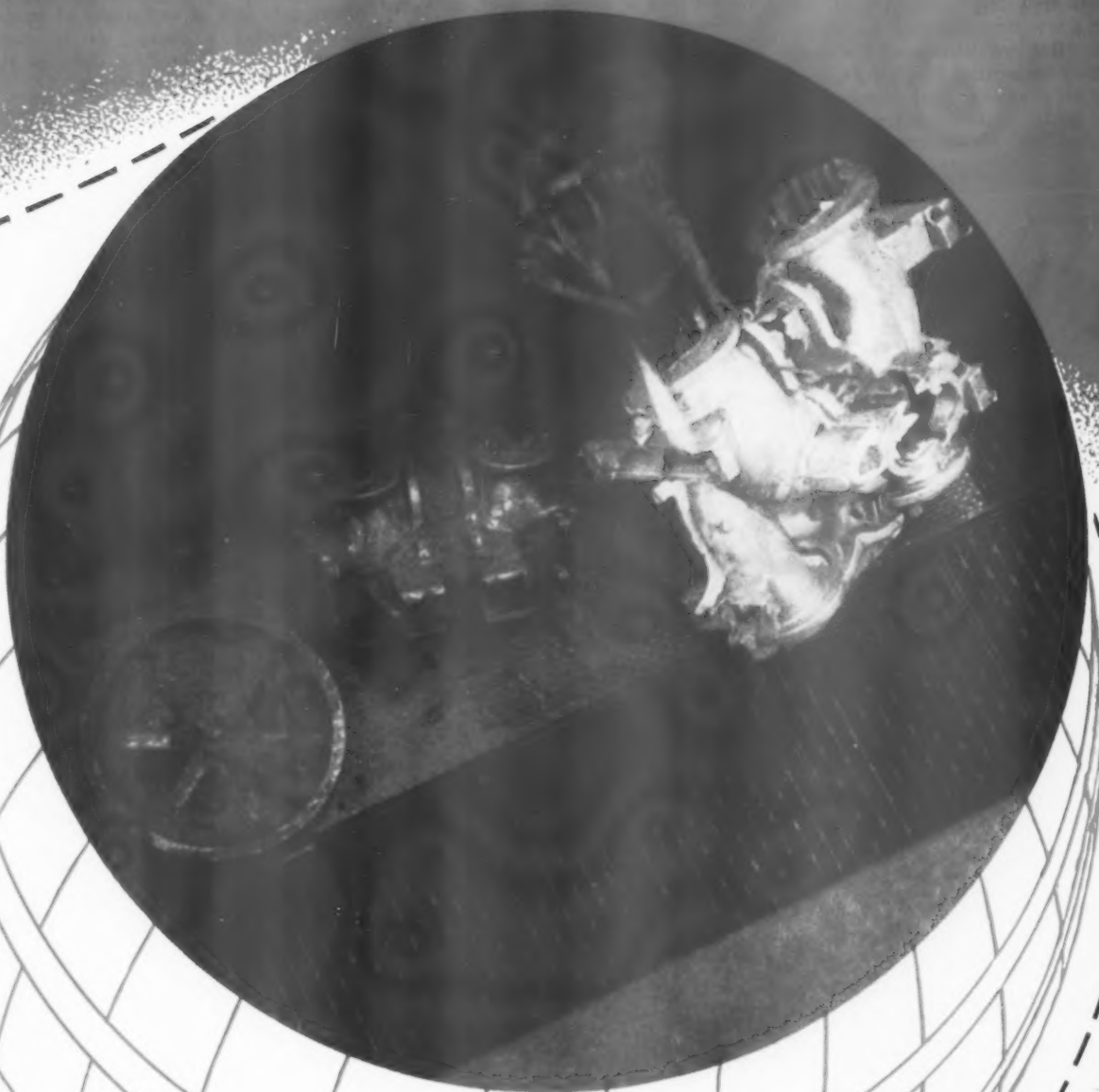
Again We Sit Around the Hydro-Blast Economical Cleaning of Castings;



There have been many barrels of ripe, red, juicy Jonathans consumed by our foundry friends since the Hydro-Blast method of cleaning castings joined hands with the "apple a day" theory for dog-tired delegates. Whether the locale be Buffalo, Chicago, Cleveland, Cincinnati, New York or Milwaukee, it's easier to gather foundry facts when seated in a comfortable chair and munching on a mealy morsel.

This year, Hydro-Blast has much additional evidence to present besides the cleaning of all kinds and sizes of castings to microscopic cleanliness. We want to talk to you about the recovery of sand in better-than-new condition; the consequent saving of millions of transport ton miles; the release of manpower for other essential functions; the way Hydro-Blast pays for itself through operating economies.

Apple Barrel . . . Space 48-50 TO DISCUSS the Recovery of Sand; Saving of Transport Ton Miles; Release of Manpower for Other Essential Work



The Hydro-Blast Corporation

2550 North Western Avenue, Chicago 47, Illinois

(*Continued from page 274*)

post-mortems after service failure has occurred. Scatter is the primary, underlying problem in the engineering use of materials. Opportunities for scatter occur all along the line in the ordinary sequence of production.

With the testing machine in proper calibration, properly operated, a single tensile test, for example, should be accurate within a few hundred p.s.i. for weak, or a few thousand p.s.i. for strong materials. But two castings off the same gate or two consecutive lengths of a bar, will probably vary several hundred or thousand p.s.i. There is scatter between two supposedly duplicate specimens even when no reasonable explanation can be found for the difference existing between the two.

If one of the castings has a blow-hole or a part of the bar has a large slag inclusion or a seam, the discrepancy will be greater, and in a fatigue test it might be very great.

Some difference in grain size and hardenability, produced by small additions in the finishing of a heat of steel, may exist between the first and last ingot poured.

Within an ingot or a casting, a little chemical segregation may occur. The top and bottom, and the outside and inside may vary a bit in composition because of the way alloys freeze. Microsegregation, i.e., "banding" and the like, may occur.

The range of variation due to consistent and recurrent causes such as these is reasonably predictable for given plant practice. But accident may intervene. What we class as "flaws" usually come from accidents, from some unanticipated error.

Differences in heat-treatment, e.g., owing to lack of uniformity of temperature within a charge, or to careless quenching, will produce different structures and different properties.

Other variations occur from heat to heat. "Tramp" elements in the scrap used can vary widely. There can be an error in weighing some constituent of the heat. The heat may not be "finished" at exactly the same stage, or tapped at the same temperature as another. Although there may be minor variations within a heat, and of course accidents may happen to any part of a heat, yet the heat is a unit, and scatter of properties from heat to heat tends to be very much wider than that within a single heat.

The discussions of "aircraft quality," variation in directional properties, fatigue resistance, damage under repeated stress, notched-bar impact behavior, grain-size, hardenability, and so on, have brought out the fact that a heat of steel may be a law unto itself, that it responds to particular melting conditions and finishing practice that have little to do with its chemical composition.

Vary To Considerable Extent

Heats from the high and the low ends of the chemical range will vary materially. Some handbook data are given for the average of the range, while producers hesitate to cite figures save for the low end of the range, and purchase specifications naturally are for the low end on all ranges of properties, e.g., for the lower strength at the low end of the chemical range and the lower ductility at the high end.

Differences occur due to size of section. The same cast iron will be chilled in very thin sections, very soft in large ones. In heat treated steel, if the section in which the test piece is quenched is smaller than that to be quenched for service and the steel does not harden clear through in the latter size, the test does not truly represent the material in service. Most handbook data on heat treated steel are for test specimens quenched in 1-inch diameter or smaller.

For any material and any processing technique, there is an "average expectancy" and a range of scatter therefrom. But when the engineer makes a simulated service test to indicate the adequacy of a chosen material, he does it with an individual specimen of the material. When this specimen—say an average one—proves adequate, there still remains the question whether other specimens at the extremes of the scatter band for pertinent properties likewise are adequate. It also remains to insure that

(*Continued on page 280*)

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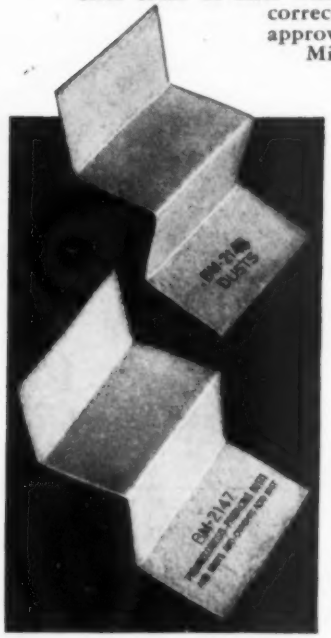

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Light Red is the color-key to protection against ALL DUSTS (including toxic dusts: lead, cadmium, manganese, etc.) Dustfoe Filters, BM-2148—Comfo Filters, BM-2133. (Both approved by U. S. Bureau of Mines.)

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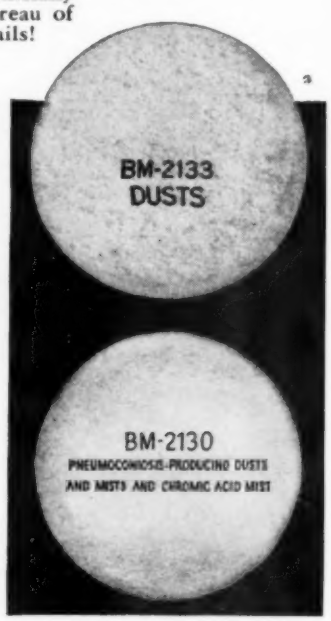
Light Green indicates protection against pneumoconiosis-producing dusts (silica, asbestos) and mists. Dustfoe Filters, BM-2147; Comfo Filters, BM-2130. (Both approved by U.S. Bureau of Mines.)



THE *Dustfoe* RESPIRATOR

GREY is the color of the Comfo Metal Fume Respirator Filter, approved by the U. S. Bureau of Mines for protection against toxic fumes from molten metals. BM-2139.

THE *Comfo* RESPIRATOR

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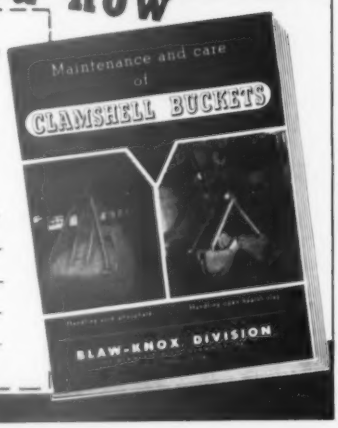

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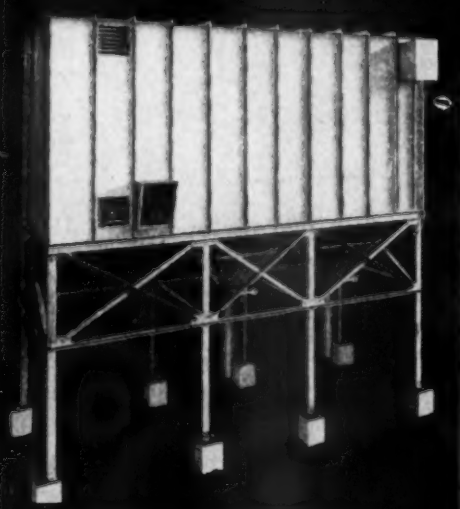

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RUEMELIN DUST FILTER

A 3283-½R

(*Continued from page* 278)

none but an adequate piece of material shall be used for the part, in spite of all accidents of production not taken into account in established normal expectancy and scatter.

If two out of 1000 parts are low in the property being examined, two are high, and 996 are in the expected range, the chances that any one part picked at random will indicate that a variation in properties exists within the lot is 4 in 1000, or 1 in 250, but there is no firm assurance that, if we test 250, one of the 4 off-quality pieces will be found—none of them may have been shuffled into the 250 we pick.

This dilemma appears worse than it is, because even random distributions follow the "laws" of chance, or probability, and engineers dealing with these problems have evolved methods of plotting and mathematical formulas that allow considerable untangling of the situation with a minimum of test data.

The first thing to do is to secure evidence about the scatter of individual observations, whether duplicate tests agree well or disagree widely, and whether successive observations, made as some variable is altered, plot in smooth curves or not.

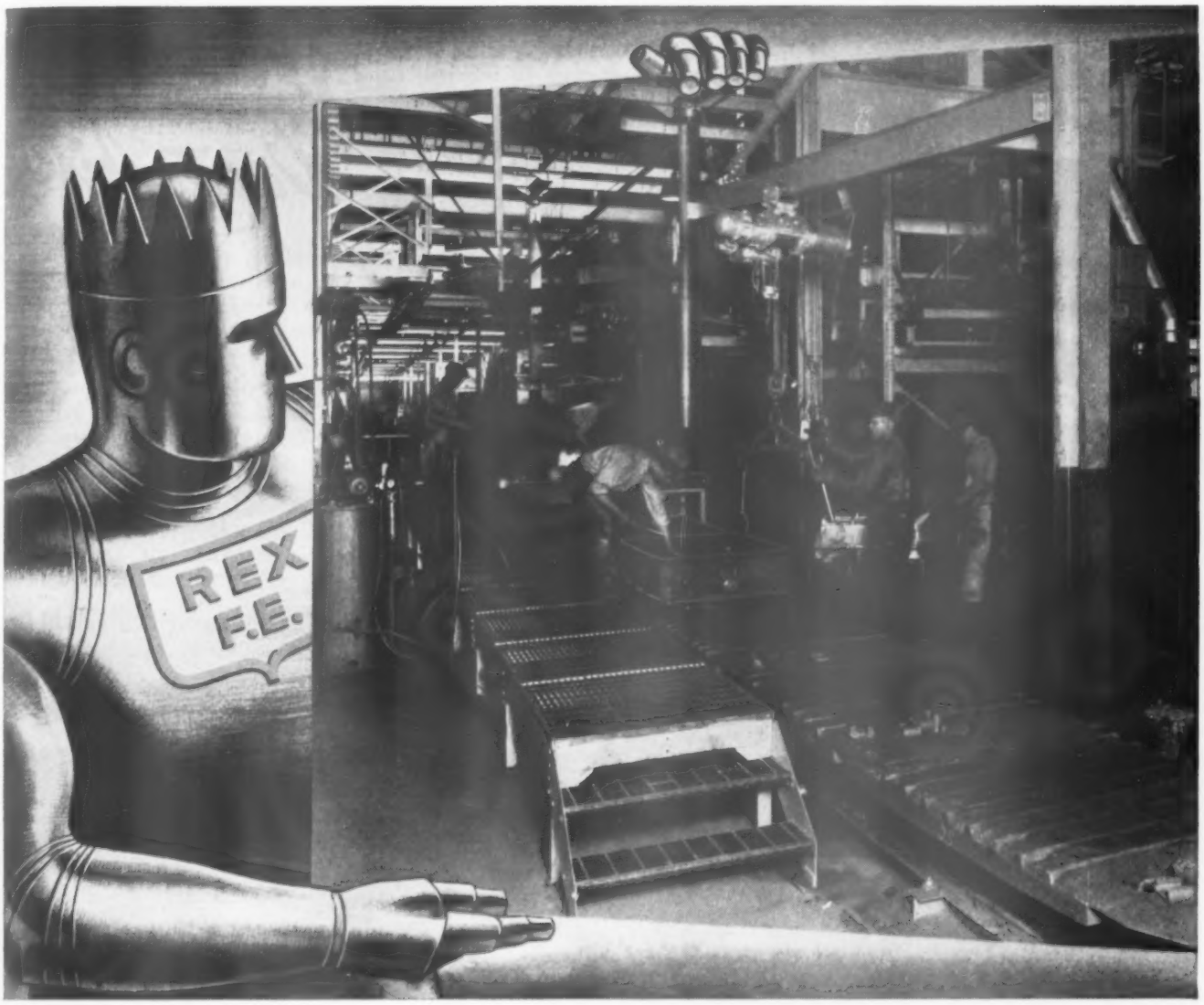
If sufficient "duplicate" tests on a lot of material are plotted on the basis of the frequency of occurrence of a particular value, the results tend to lie in a bell-shaped, humped curve, as in Fig. 6. Knowing this, more can be deduced as to likelihood of scatter than is directly shown by the observations made.

Variables Are Operating

The more sharply humped it is, the better the conditions are understood and controlled. If the scatter is wide, the hump low, but the curve still symmetrical, there are a variety of causes operating. If the curve is skewed in one direction or the other, the curve is trying to tell us that some factor is disturbing the normal distribution and we had better look about to see what the cause is. If the curve has two (or more) humps, it definitely tells us that two (or more) different, important variables are operating. (Fig. 7)

When a wide scatter of properties is found to exist in the final product, by very extensive sampling and testing it is logical to work back through the processing, and sample and test at the various stages until it becomes apparent where the factor responsible for variation lies. Adequate testing at that point, on pedigreed specimens, should smoke out the variable that has been hiding and allow putting it under control. Or, if the cause of the variation is found to be in the raw material rather than in the processing, the supplier of the raw material then has to go through the same line of study on his own processes. Ultimately the vital locations for sampling and testing will come to light, and a reasonable amount of control and testing at that location will reduce scatter.

(*Continued on page* 282)



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(*Continued from page* 280)

make the final product more uniform and reliable, obviate much of the later testing that would otherwise be required, and let the designer design in confidence that the materials he admits by a correctly drawn specification and by the testing they have undergone at the point where it counts, will produce parts so reliable that neither large factors of safety nor elaborate tests of the final assembly of the parts are necessary.

When mechanical tests are legitimately used for control *processing*, the engineer should be on his guard for the tacit assumption that the figures are necessarily correct ones for use in *design*.

The relation between properties of test bars and properties of castings, is a case in point. Test bars for evaluation of cast metals are seldom taken from actual castings. They are poured separately, or at least separately gated and are standardized so that ample feeding is provided to offset shrinkage. Complex castings usually have sections that, for production reasons, are not gated and fed in optimum fashion, so the centers of heavy sections and the junctions between heavy and light sections are prone to shrinks and draws.

Increase Casting Strength

It is stated that[21] "it is frequently possible to increase the strength of improperly gated castings, as determined by actual breakdown tests, by as much as 50 to 100 per cent through the redesign or relocation of the gates". This comment refers to aluminum castings, but is pertinent to all castings and could even be stated more strongly in respect to alloys of high solidification shrinkage.

The separately cast test bar evaluates the quality of the molten metal ready to cast, but does not evaluate the casting. The engineer's design of the casting so that it is possible to make it sound, and the foundryman's know-how in gating, risering, and control etc., have much more to do with the sericeability and the actual strength of a casting than do those variations in the molten metal that are reflected in the figures obtained by testing separate test bars. Cutting up actual castings and testing their heavy and light sections is likely to prove an eye-opener. The light sections may turn out a lot better and the heavy ones a lot worse than the "standard" test indicates.

The separately cast test bar is very useful to the producer as a method of control of molten metal quality, to eliminate scatter from heat cause, but it tells nothing at all about scatter from causes operating after the metal leaves the ladle.

Consideration of scatter leads to realization of the necessity of making tests and drawing specifications that are pointed at the exact properties it is desired to control, to accomplish the end in a straightforward manner, rather than by indirection.

To get straightforward information, special tests often are needed. Some tests have *no meaning at all* unless they are specifically planned to correlate with

(*Continued on page* 284)

NOZZLE WEAR Wastes Air

Compressed air costs money. When your nozzles wear you not only lose the efficient concentration of the blast, but also run air costs way up. "Cheap" nozzles can be unbelievably expensive.

To save on compressed air costs, to get more uniform results and to cut your costs per hour to the absolute minimum, you should learn more about American-Heanium Long Lyfe Nozzles. They have a ceramic insert of nearly diamond hardness that is hard to beat for its wear-resistant properties. Write today for further information.

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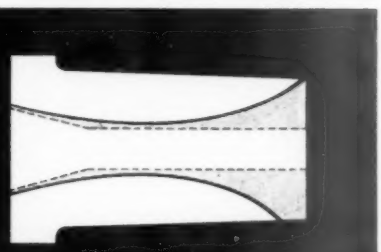
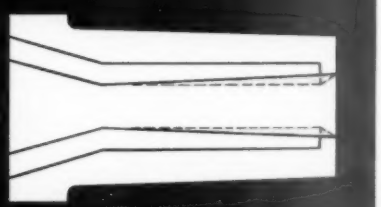


The illustration shows an iron nozzle after use for an hour or two. Note how the orifice has expanded. This means increased compressed air cost and less cleaning efficiency.



This drawing shows an A-H Nozzle after many hours of hard usage in a high pressure sand blast. Note that the orifice is only slightly worn.

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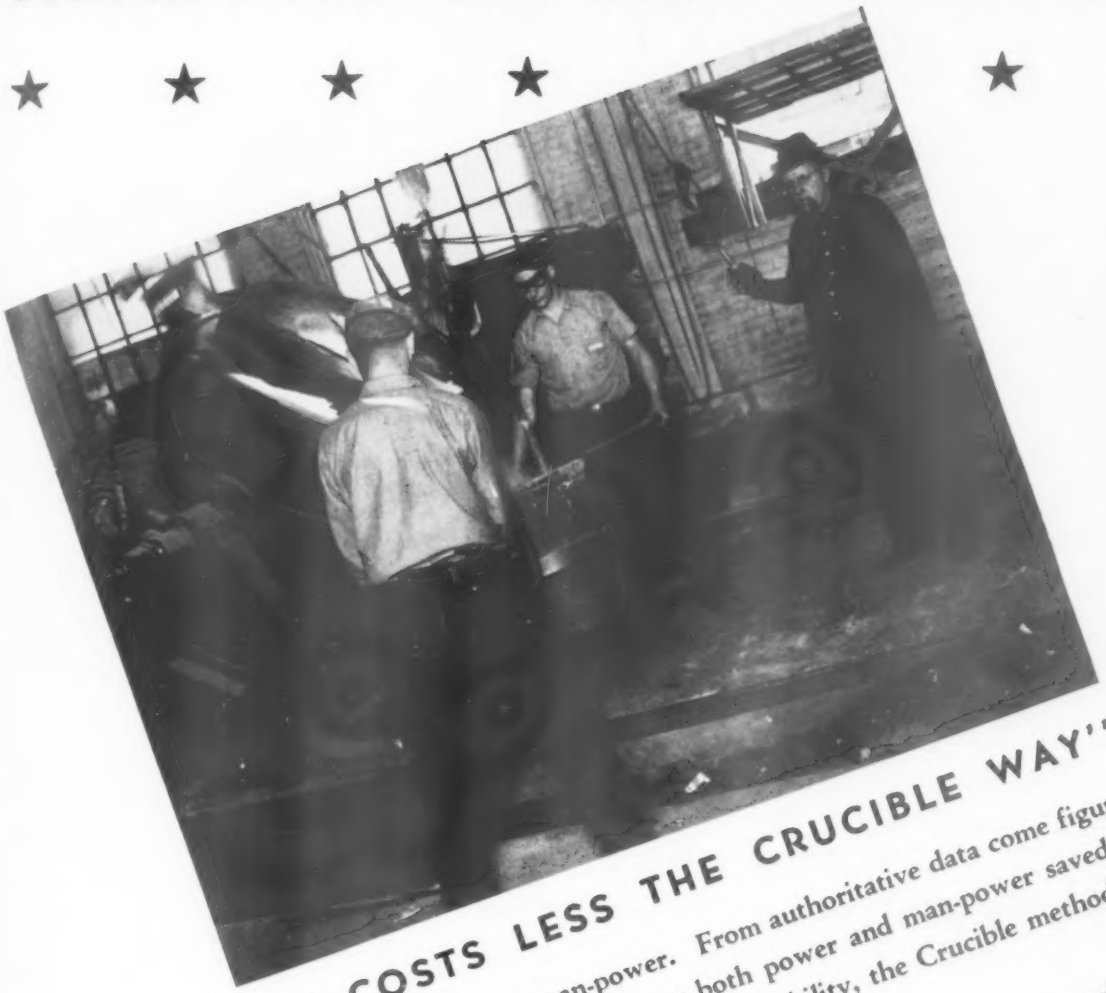
CONSERVE MAN-POWER *with Crucible Melting*

★ ★ ★ ★ ★ ★ ★



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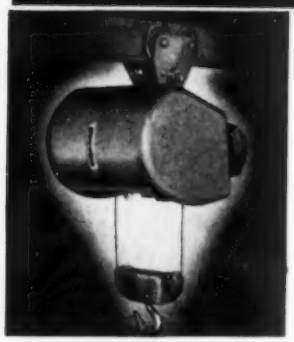

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(*Continued from page* 282)

service. Under such special tests can certainly be listed tests for corrosion-resistance, for wear-resistance, and for properties as bearing metals. With almost equal propriety, those for resistance in high temperature service can be included. As has been pointed out earlier, damage testing in fatigue, and notched-bar impact testing may also fail to give truly pertinent information unless the service conditions are duplicated with a great deal of exactness.

Corrosion is a chemical process, hence corrosion resistance is not unaffected by the chemical composition of an alloy. Most types of corrosion of steel, however, are not particularly affected by small changes in composition. Iron rusts, and whether we use iron of 99.9 per cent purity or a constructional steel that contains 95 per cent iron, the iron is in the ascendancy and they all rust about alike. For ordinary steel then, protecting by some coating—as by painting, enameling, or galvanizing—is necessary unless the corroding influence can be kept away by other means.

The nature of the corroding medium is of great importance, so in testing for corrosion resistance it is necessary to make sure that we use the actual corroding medium that will occur in service. As a rough guide it may be said that in testing corrosion resistance in the laboratory, unless the corroded surface looks just like one corroded in service, the test will probably mislead rather than guide. It is essential that the test equipment and test method be designed to reproduce the corrosive environment of service. Otherwise the results are worse than useless, as they tend to be misleading.

Corrosion Added to Stress

It is now well known that repeated stress combined with simultaneous corrosion is far more damaging than the mere roughening or pitting due to corrosion prior to application of repeated stress.

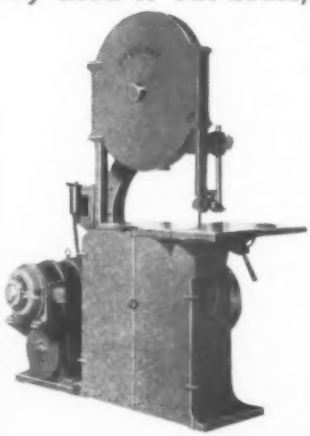
Just as in plain corrosion, corrosion fatigue is influenced by chemical composition, so the chemical composition is not negligible from the point of view of corrosion fatigue. This, however, is more in evidence among nonferrous alloys and among the highly-alloyed "stainless" steels and very little in evidence among everyday as-rolled, normalized, or quenched and tempered steels. Avoidance of corrosion-fatigue failures of constructional steel therefore generally is to be accomplished by preventing corrosive liquids from coming into contact with the steels under repeated stress, not by adjusting the chemical composition.

An important type of attack which may occur in heat treatment can be classed under corrosion. This is when heat-treatable steels, or those for normalizing, are heated in the air or in products of combustion; they oxidize and scale, and some of the carbon near the surface may be burnt out, so that the steel has a decarburized "bark" or soft

(*Continued on page* 286)

Cut Castings Costs with Crescent SPRUE BAND SAWS

• Crescent sprue and metal cutting band saws are designed to handle every type of metal cutting task from foundry to final fabrication. Above is a battery of Crescent sprue cutters in the plant of a Detroit aircraft stampings manufacturer, where they have been adapted to pre-welding cutting on stampings. Crescent can furnish you with standard single speed or variable speed sprue band saws in sizes of twenty-six, thirty-two, thirty-six and thirty-eight inches. Crescent sprue saws can be successfully used to cut brass, bronze, aluminum, magnesium, manganese, cast iron, stainless and sheet and bar steel. If you have a particularly tough metal cutting problem, let Crescent help you solve it. Your request for Crescent's Sprue and Metal Cutting Band Saw catalog, or any foundry metal cutting information, will receive immediate attention. Write today. Department F-M, The Crescent Machine Co., Leetonia, Ohio.



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(*Continued from page* 284)

skin, lower in carbon than the interior. When attempts are made to reduce scaling by bathing the steel with unpurified products of combustion, decarburization is likely to be accentuated. Soft skin obviously is bad from the points of view of wear resistance, and of fatigue resistance. To avoid scaling and decarburization at the same time, "controlled atmospheres" for heating have come into wide use.

Scaling and decarburization are the results of chemical attack, so the differences among steels as to whether they are or are not "free-scaling" in air, and as to how they react with a given controlled atmosphere, are related to chemical composition.

Wear is an undesired change of dimensions in service resulting from pressure and sliding exerted by some other body. Wear of metals is brought about by contact with an abrasive, nonmetallic material, or by contact with some metallic material. It is a primary principle to see to it that what wear cannot be avoided is chiefly upon the more easily replaceable of two co-acting parts. Wear of metals against abrasive is often akin to intentional removal of material by sandblasting, grinding, or machining, where the object is to tear off the surface in larger or smaller chips.

Wear Caused By Abrasive

Even what would ordinarily be appraised as "metal to metal" wear is often caused by abrasive rolled or scraped between the surfaces, grinding them away. Small amounts of abrasive often cause serious wear. Furthermore, the wear debris is itself an abrasive and has to be considered.

The glazed appearance of a properly worn-in metal that has rubbed against another in service is good evidence that the metallic surface has been covered by some sort of an adherent film that has prevented welding. Providing some temporary coating to avoid welding while the worn-in coating is being built up, such as a tin or cadmium flash on pistons, is often resorted to. That a chemically produced coating of aluminum oxide, a strongly abrasive material, on the surface of an aluminum piston reduces wear on the cylinder walls, indicates the powerful effect of adherent anti-welding coatings.

Ability to wear-in and glaze under operating conditions is highly helpful against welding and seizure. Cast iron often is one of the best choices for wear resistance, due to the glazing ability given by its graphite flakes. One generalization about cast iron for metal-to-metal wear is that cast iron with free iron crystals, what the metallurgist calls "free ferrite", is usually very poorly seizure resistant. It should be noted that neither the chemical analysis of a cast iron nor its ordinarily determined mechanical properties gives assurance of absence of free ferrite. It is avoided by proper additions at the end of the melting operation, but whether these have been prop-

(*Concluded on page* 288)

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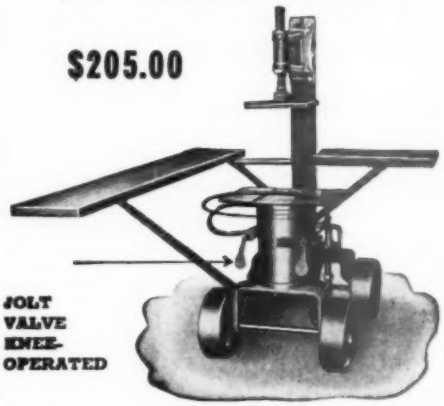

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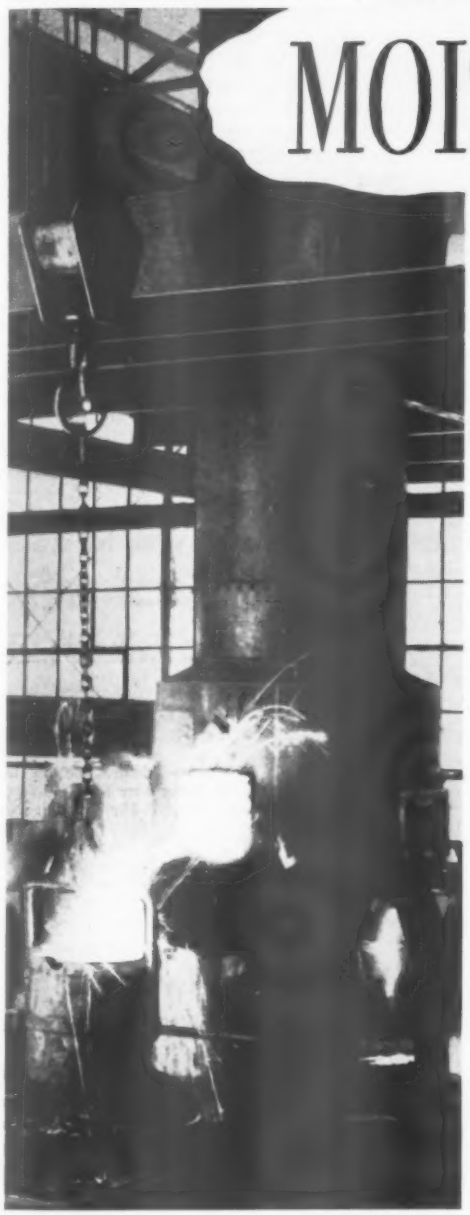

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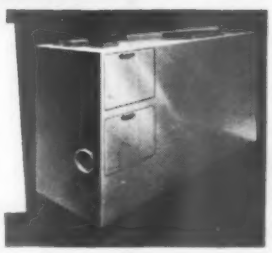

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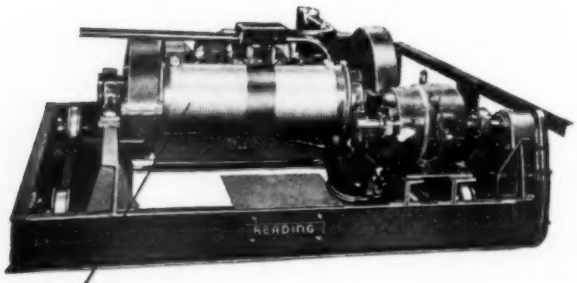

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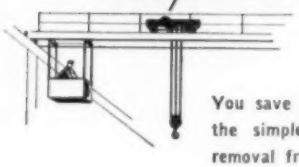

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(*Concluded from page* 286)

erly made can only be shown by metallographic examination or wear testing.

Any wear test must take into consideration the part worn, its surface condition, the material exerting pressure and its surface condition, the presence of abrasives and corrodents, and the pressure exerted. All students of wear testing ultimately come to the conclusion expressed by Mochel[22]: "To study wear, or carry out wear tests that will have significance, the apparatus must very closely, if not entirely, duplicate the service conditions that are the cause of the wear".

(*To be concluded*)

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Advisory Committee Appointed by WPB

An industry advisory committee among manufacturers of Rolls-Royce Merlin aluminum castings recently was formed by the War Production Board. Stanton W. Ballard, WPB Aluminum Division, is government presiding officer, and the membership includes:

D. W. Bay, Aluminum Alloys Corp., Detroit; Bruce Burroughs, National Bronze & Aluminum Foundry Co., Cleveland; N. Harold Boardman, Elmira Foundry Co., Elmira, N. Y.; B. A. Dollens, Delco-Remy Corp., Anderson, Ind.; L. D. Harkrider, General Malleable Corp., Waukesha, Wis.; Frank C. Howard, Howard Foundry Co., Chicago; Ed P. Haas, Metal Parts Corp., Racine, Wis.; Fred Maytag II, Maytag Co., Newton, Iowa; Harry L. Smith, Aluminum Co. of America, Cleveland; Arthur B. Schnell, Aluminum Industries Inc., Cincinnati; R. J. Roshirt, Bohn Aluminum & Brass Corp., Detroit; M. E. Van Riper, National Foundry & Machine Co., St. Louis, and Karl A. Stein, Acme Pattern & Tool Co., Dayton, O.

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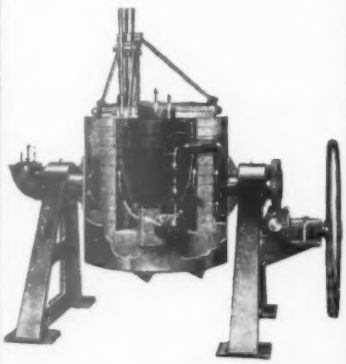

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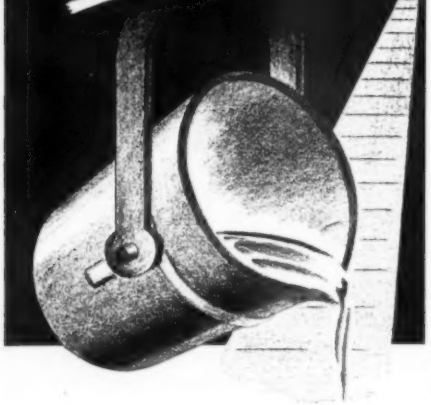

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CONVEYORS—An attractive bulletin issued by Robins Conveyors Inc., Passaic, N. J., has a page devoted to the history of the company since 1891 when Thomas Robins developed a rubber-covered belt conveyor. A series of photographs takes the reader on a tour of the plant from the preliminary engineering department to the erection department and shipping dock. Brief descriptive paragraphs and illustrations on the last two pages cover items of equipment employed in moving materials: Bucket conveyors, rail clamps, reclaiming systems, screens, ship self unloaders, ship steerers, skip hoists, stackers, takeups, towers, trippers, weigh larries, winches and windlasses.

CARBON PRODUCTS—A new bulletin, Catalog Section M-8000, covering the industrial application of carbon and graphite products recently has been issued by the National Carbon Co. Inc., P. O. Box 6087, Cleveland, 1. The bulletin also points out that many grades of carbon and graphite are available. A great variety of forms, shapes and structures are made possible by extrusion, molding, machining and fabrication.

FIRESTONE—A folder recently issued by the Cleveland Quarries Co., Builders Exchange Building, Cleveland, features the report from a prominent foundry where the company's product was in use over a period of 5 years with highly satisfactory results as a cupola lining material. Results are credited to the high fusion point of silica firestone and to maximum resistance to wear and abrasion at high temperatures.

FOUNDRY MIXER — Construction features and operating details of a multi-blade foundry mixer are described in a folder recently issued by the Freeman Supply Co., 1152 East Broadway, Toledo, O. Units are available for handling loads ranging from 3 to 60 cubic feet. Three drives are offered: Flat belt drive, V-belt drive, or geared head drive.

SWING GRINDER—A folder recently issued by Fox Grinders Inc., Oliver Building, Pittsburgh, 22, directs attention to several meritorious features of its swing grinders, including perfect balance in any position, easy maneuverability operation, ball bearing spindle, full vision for the operator at grinding point, and 2-year mechanical guarantee. By stepping belts over to higher speed ratio the peripheral speed of the wheel can be maintained as the wheel wears down.

OPEN HEARTH BOTTOM — Basic Refractories Inc., Cleveland has issued a folder describing a special refractory material, Ramix, for new hearth construction or major bottom repairs in open hearth and electric furnaces. It is claimed the material is one of the simplest of all prepared refractories to install. Shipped in bags of approximately 100 pounds it is merely tempered with water, shoveled into the furnace, spread and rammed in place with a pneumatic rammer. Drawings and text indicate method of application. A second folder by the same company is devoted to the merits of Syndolag, a rice-size clinkered dolomite that saves fettling time, maintains melting capacity, reduces repairs and lowers refractory costs in the operation of open-hearth and electric furnaces.

TESTING MACHINES — A folder issued by the Riehle Testing Machine Division of American Machine & Metals, Inc., East Moline, Ill., features rubber mounted dial panel with inclination, extensometer-specimen-load indicator and speed control scale, two motor drives spherically suspended gripping head and table, high pressure piston pump, testing speed scale, all-steel construction, precision workmanship, fine finish, compact design. All sizes can be supplied as single purpose machines for either tension, compression or transverse testing. They also are available as universal machines with additional tools for brinell hardness tests.

REFRACTORY — A folder recently issued by the Ironton Fire Brick Co., Ironton, O., describes a highly refractory material for general use where high temperatures are encountered in the metallurgical industries. It is used for ladle lining, side blow converters, electric furnace bottoms, rammed cupola lining, cupola breast and slag holes. Directions for using include a table of recommended thickness of lining for ladles of various sizes.

Gray Iron Castings Data Released

Shipments of gray iron castings during the first 11 months of 1943 by approximately 93 per cent of the industry totaled 7,773,000 net tons, according to data compiled by the War Production Board and released by the Bureau of the Census. As of Dec. 1, 1943, the industry had a backlog of about 2,134,000 tons, equivalent to 6 weeks' production. Reports from more than 2000 out of a total of about 2214 gray iron foundries are included in the compilation.

Comparative monthly shipment figures for last year in net tons follow:

January	622,907
February	613,241
March	720,310
April	760,583
May	746,857
June	760,520
July	660,630
August	691,620
September	742,357
October	742,101
November	712,079

November operations by the gray iron casting industry were at 50.9 per cent of the reported capacity. The WPB report stated that "with the exception of certain highly specialized castings, such as cylinder blocks and diesel engine parts, the industry has adequately met the war requirements for gray iron castings, despite the fact that a serious manpower shortage existed in many of the gray iron foundries."

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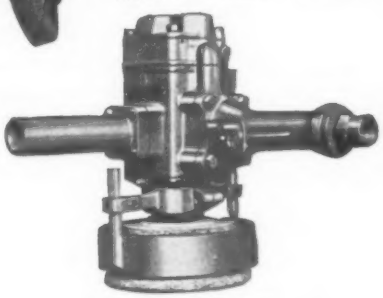

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Cortland Grinding Wheels Corp., Chester, Mass.
Detroit-Star Grinding Wheel Co., 111 Cavalry Ave., Detroit, Mich.
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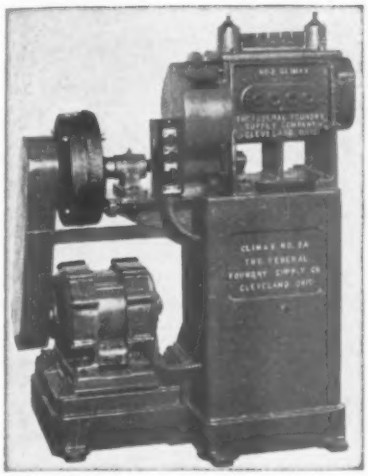

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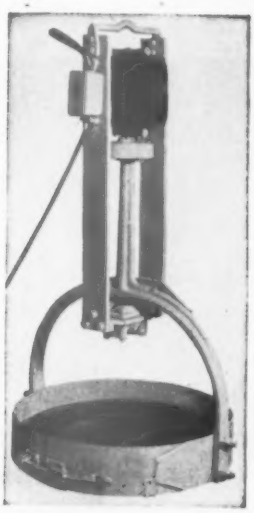

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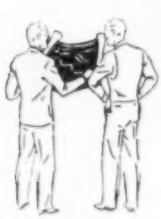

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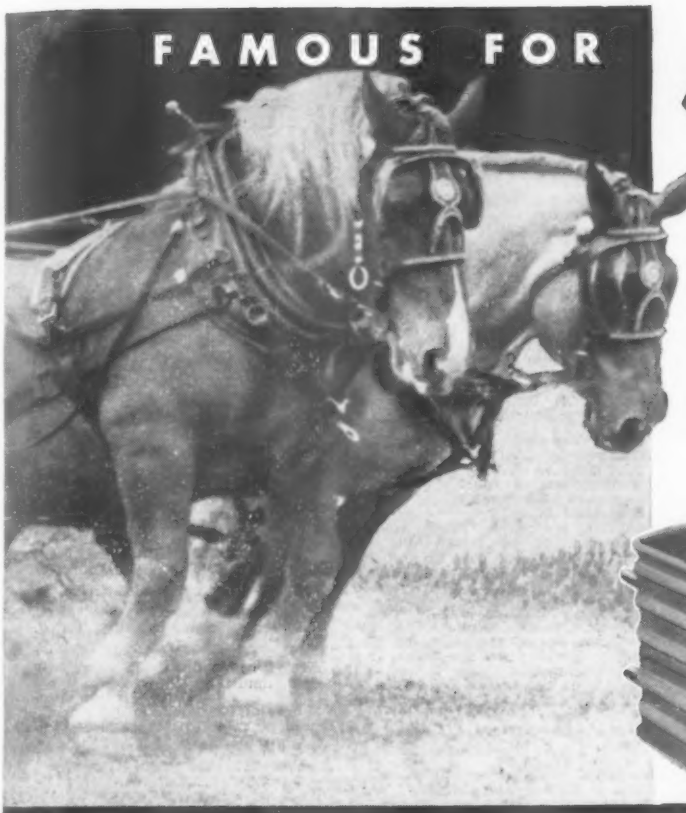

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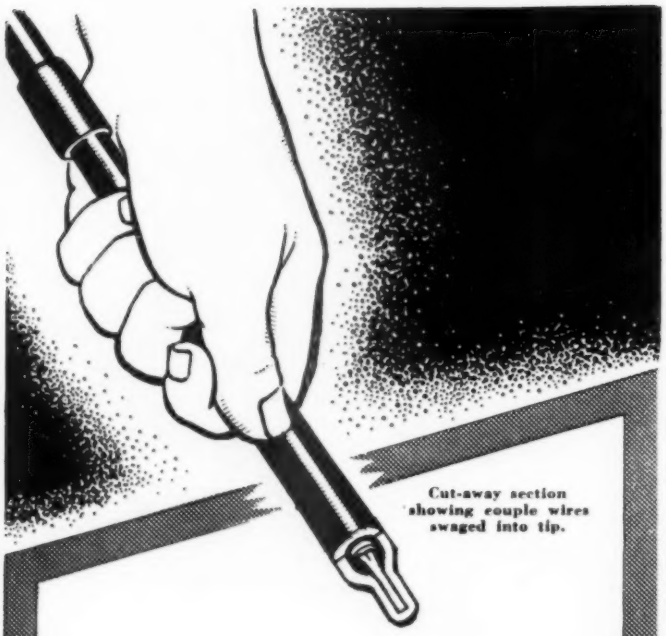

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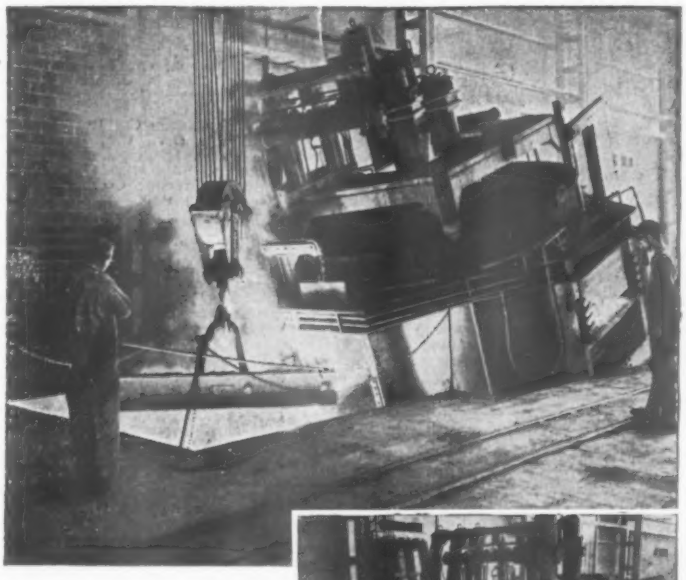

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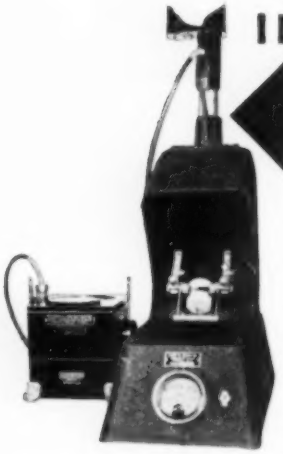

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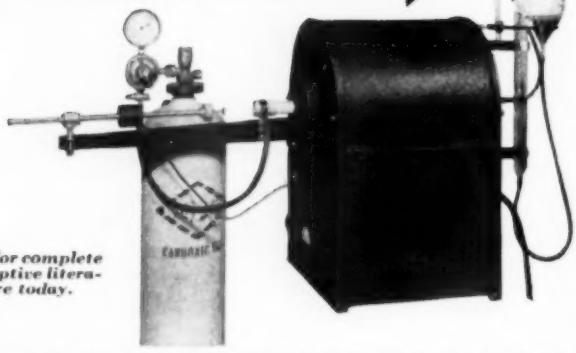

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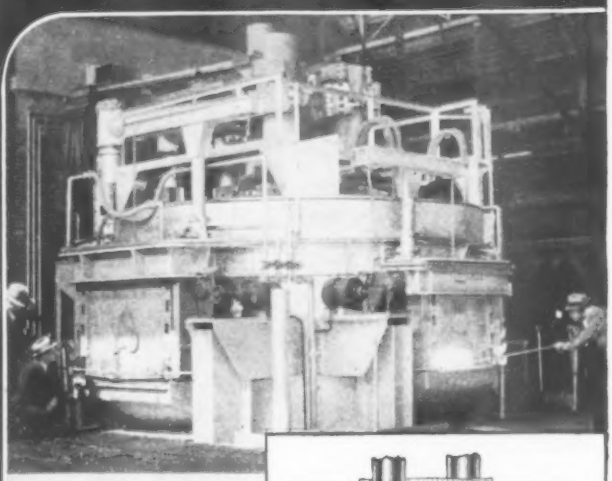

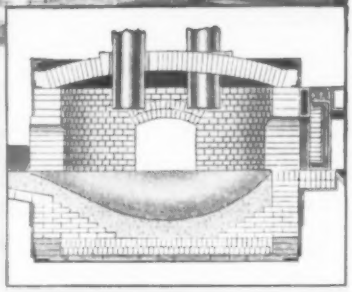

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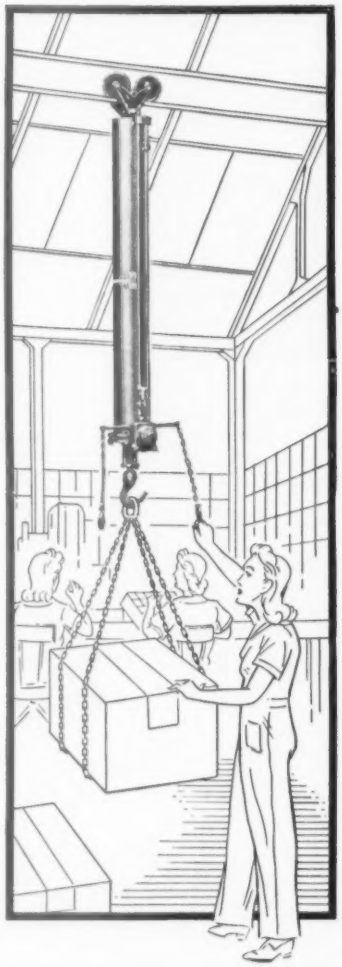

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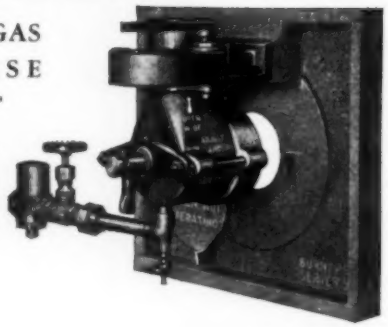

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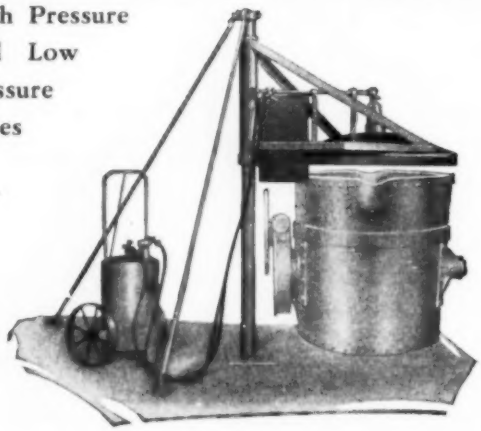

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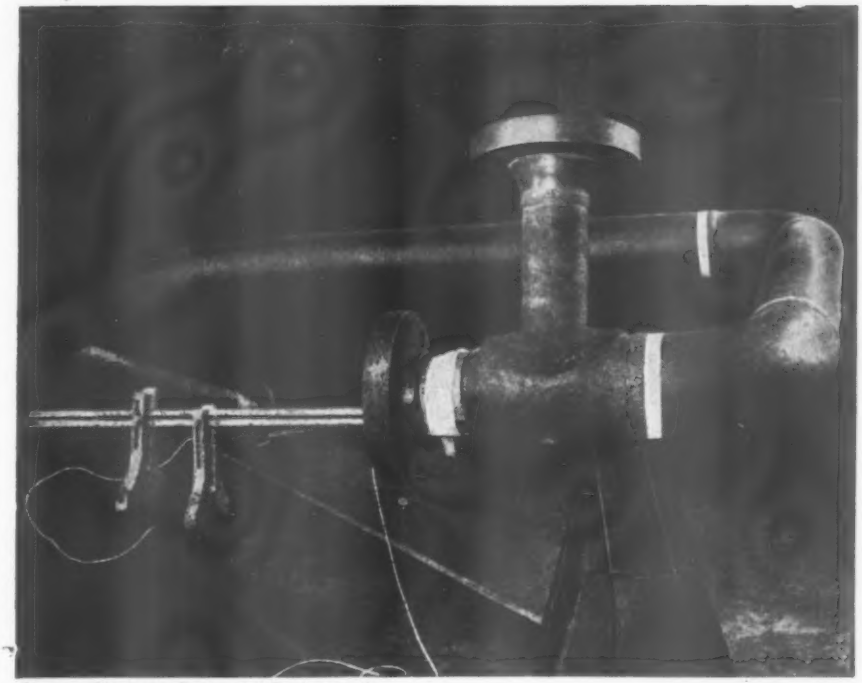

Courtesy Pittsburgh Piping and Equipment Co.

The illustration shows radium being used to take a radium-radiograph of a weld. Placing the radium centrally in the pipe and the film on the outside permits of taking a radiograph of the entire circumferential weld with one exposure. This is just one of the many advantages of the use of radium for industrial radiography.

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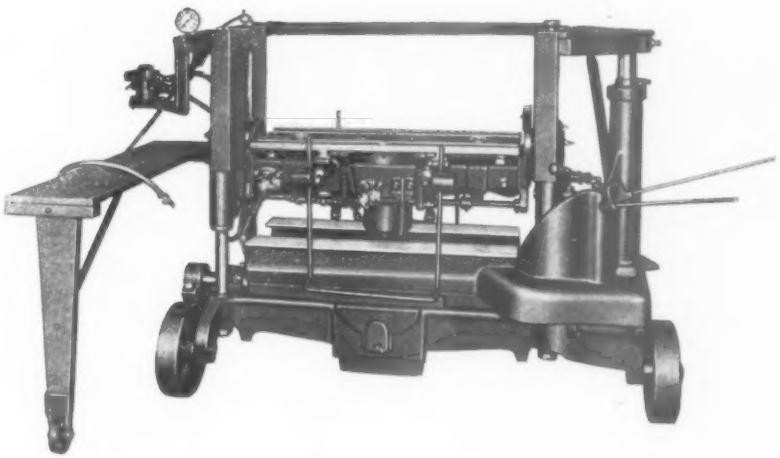

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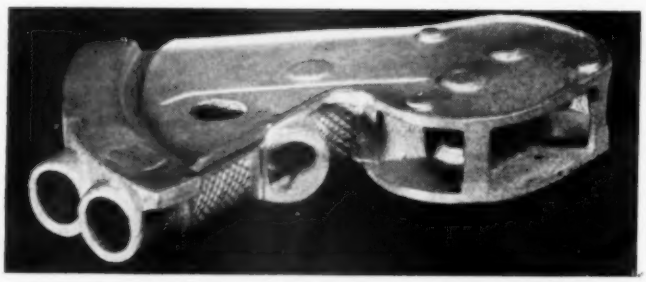
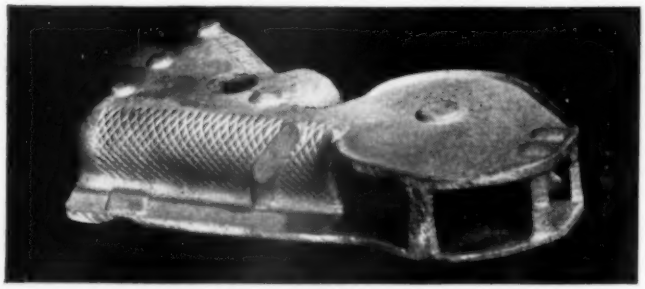
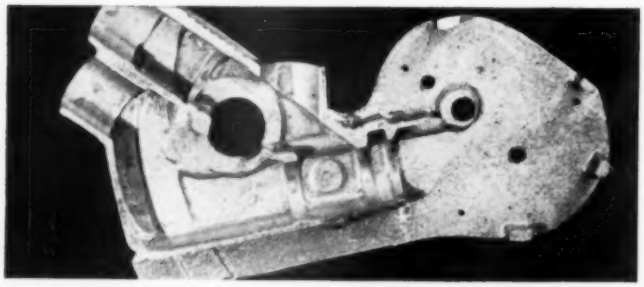


THE PROBLEM: How to save time and labor in the production of this aluminum sextant housing (made by Frank L. Phillips Co., Binghamton, N.Y.).



THE SOLUTION: The THOR technical man saw that hours of special furnace heating were being used to burn out the oil sand. He recommended the **THOR PLASTIC BINDER** (urea - resin) — to be baked at the same oven temperature. (For magnesium, the temperature would be lowered.)



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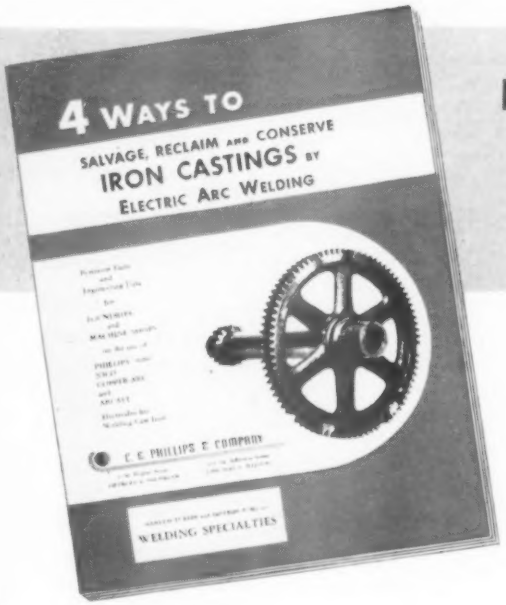

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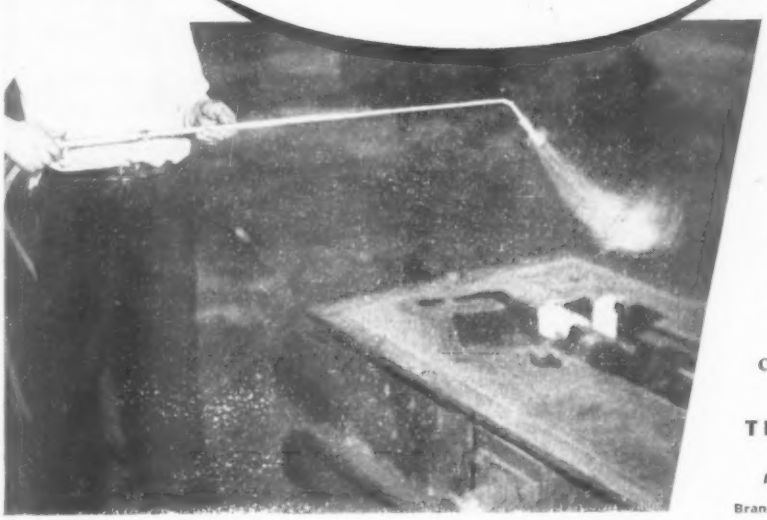

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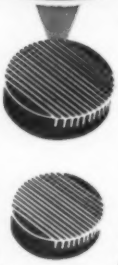

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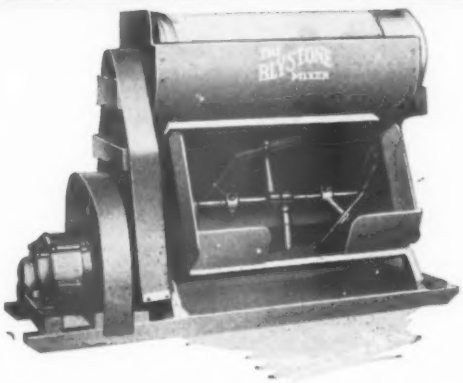

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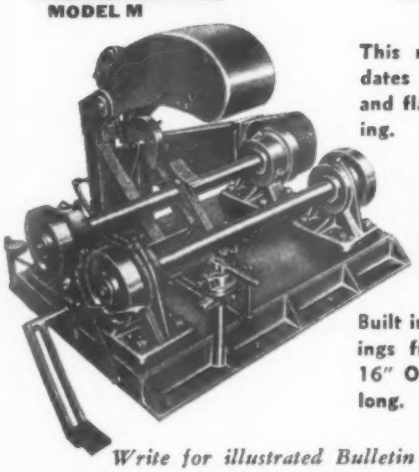

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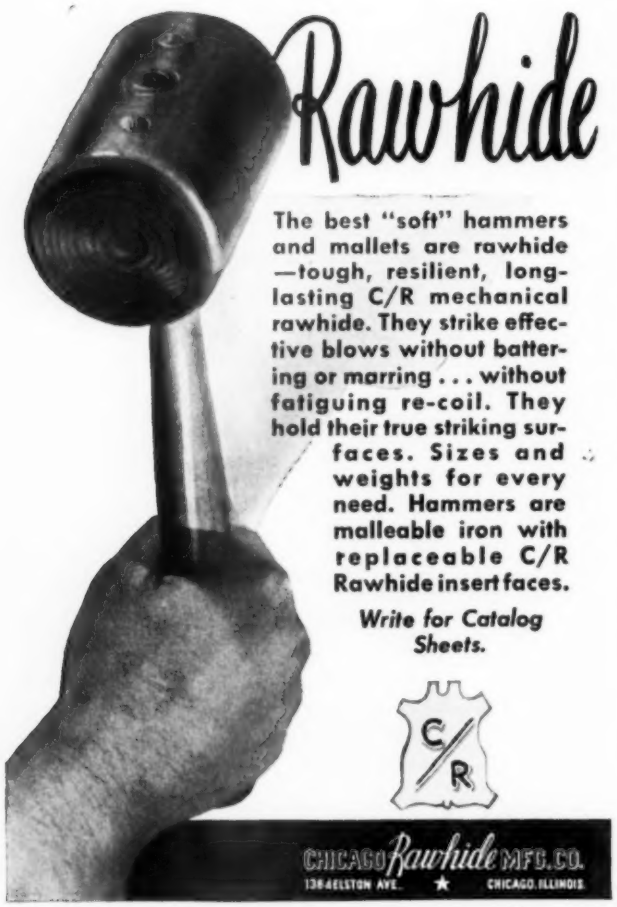

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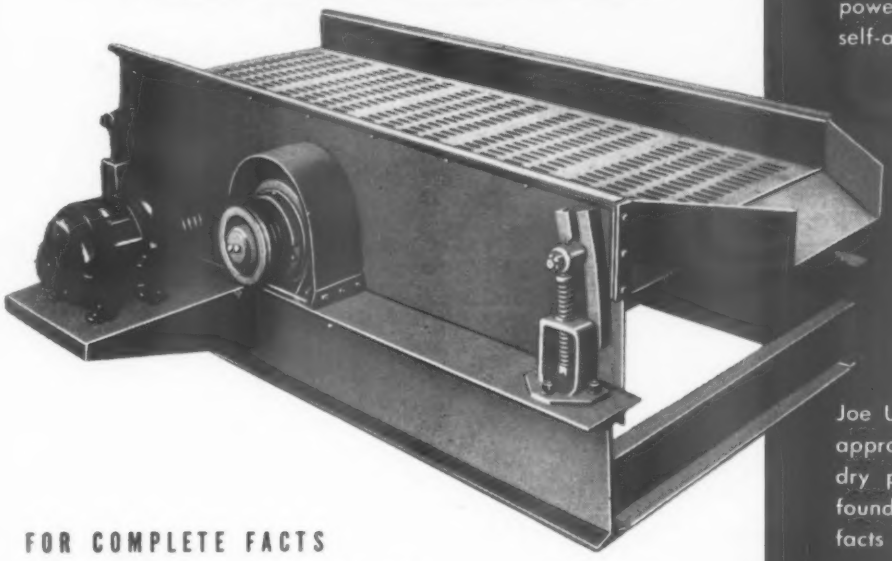

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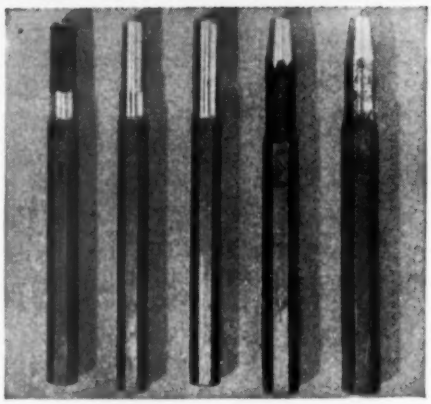

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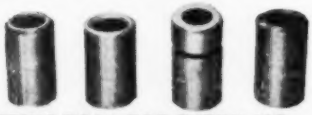

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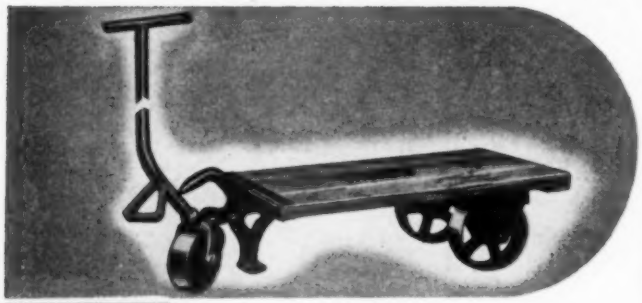

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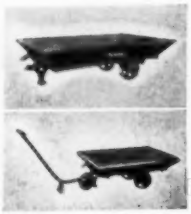

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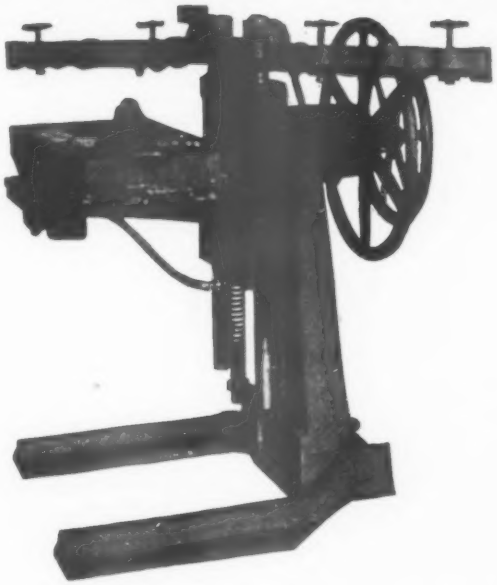

The machine illustrated is the Model C-414 in pattern drawn position. Capacity of flasks 36 x 46. This machine is being widely used for the accelerated magnesium castings production.

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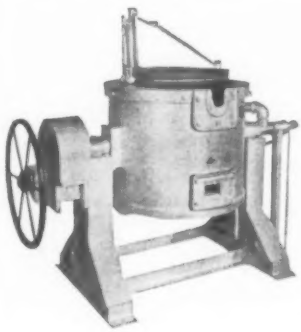

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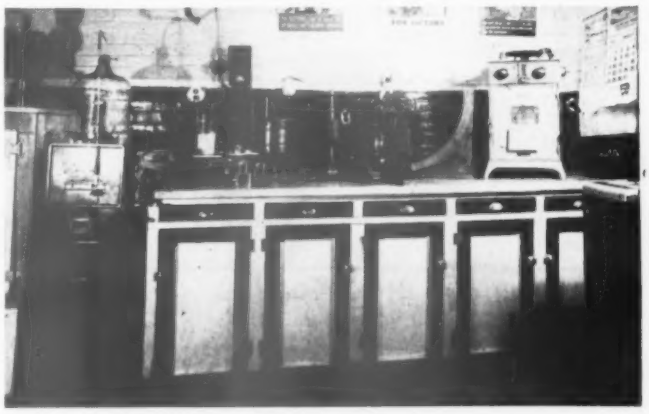

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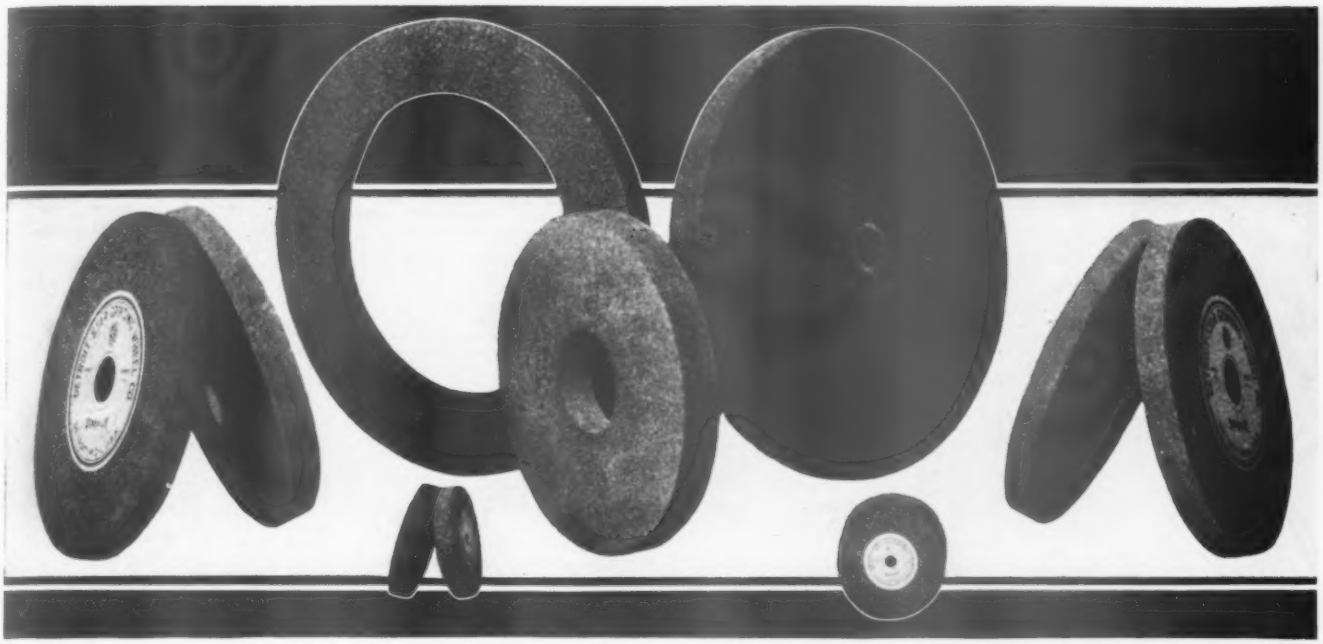

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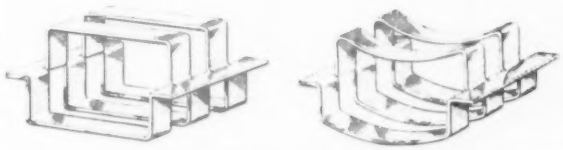

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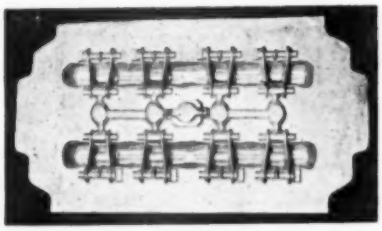

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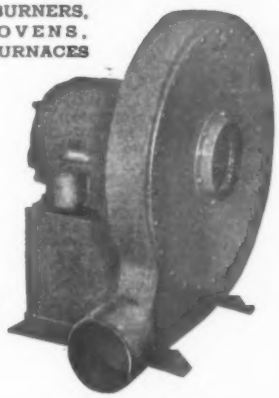

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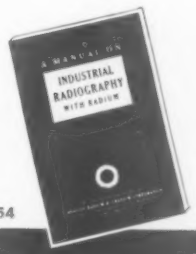

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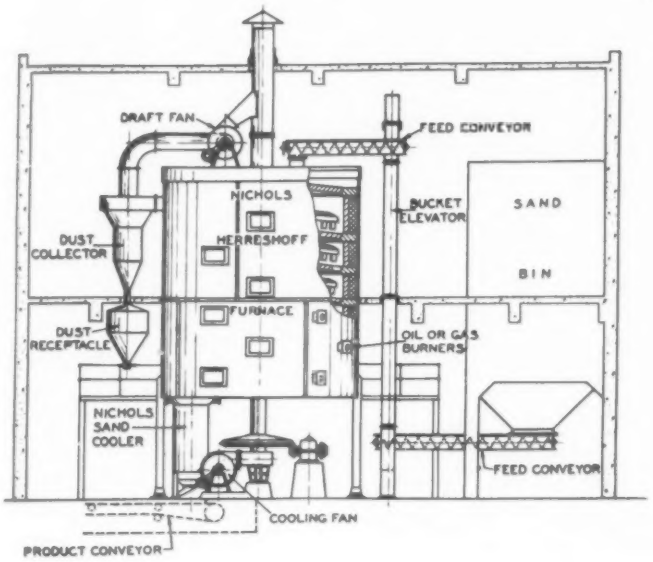

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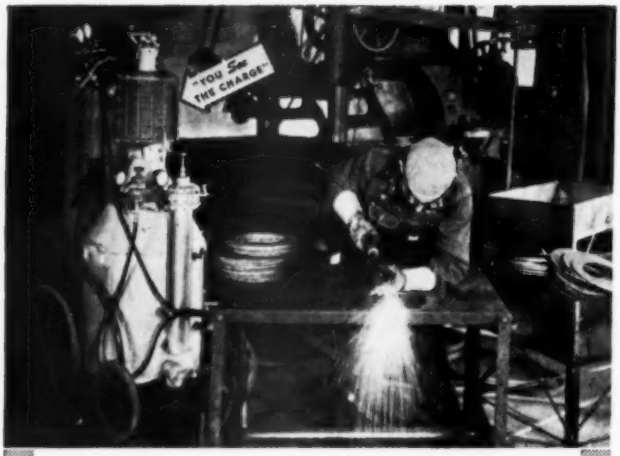

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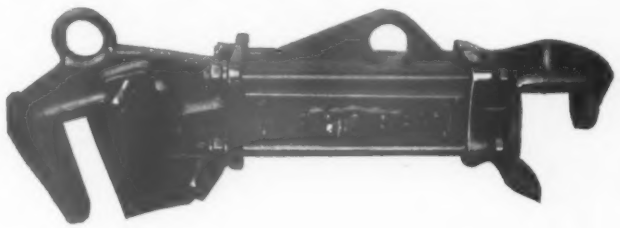

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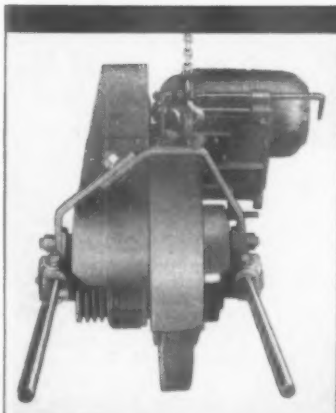

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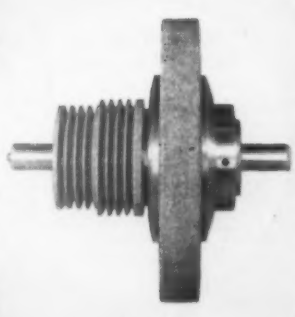

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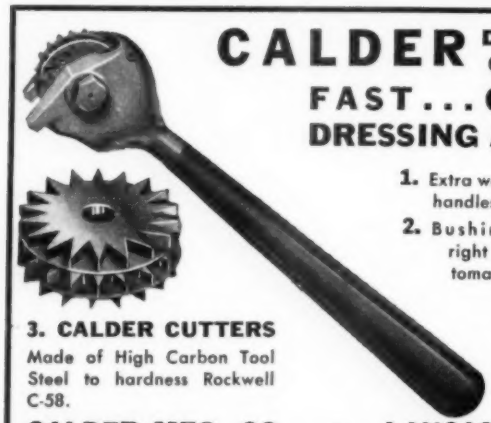

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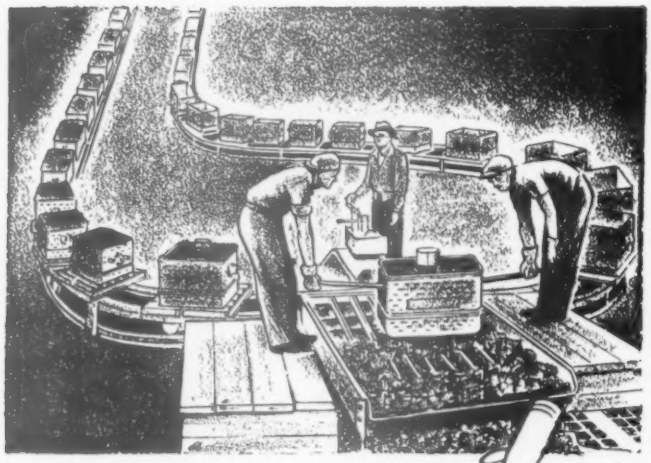

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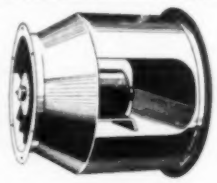

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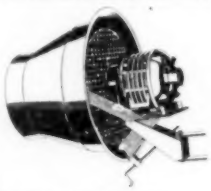

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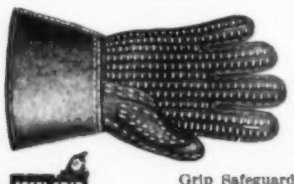

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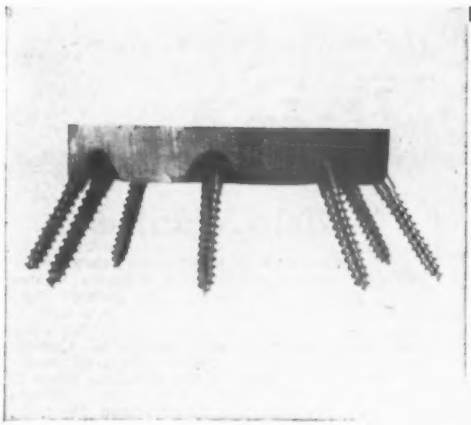

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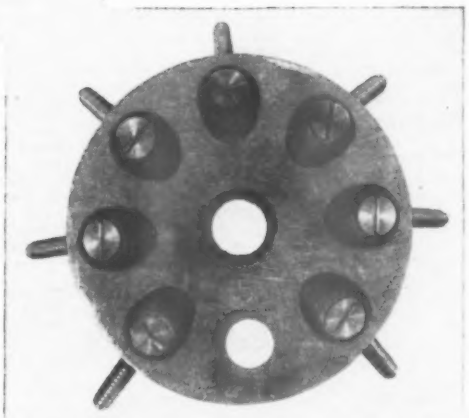

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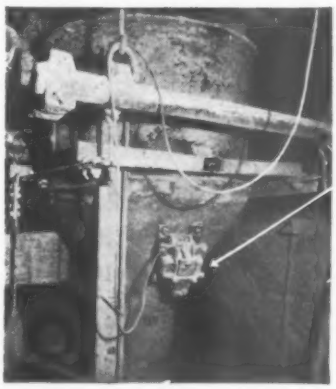

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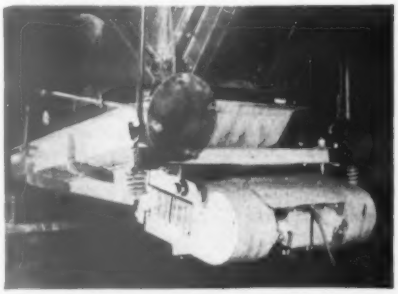

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Working foreman for core room, experienced in core mixtures, production methods and able to supervise men and women coremakers. Philadelphia district, steady employment, new position immediately available. Address: Box 367, The FOUNDRY, Cleveland 13, Ohio.

ASSISTANT FOUNDRY FOREMAN

Green sand Iron Foundry Assistant Foreman with experience in rigging and molding with one of the largest jobbing foundries in the east. Must handle machine and floor molding and be capable of training and leading men to get highest possible production. All kinds of miscellaneous castings involved, including diesel engine parts. Give full particulars including past employment record, type of work handled, number of men supervised, and salary expected. Address: Box 431, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPPLY SALESMAN

To handle complete line of Supplies, Facings and Equipment in New England States. Salary and Commission. Full particulars on application. Address: Box 443, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Steel and gray iron molders
Union shop

N. & S. FOUNDRY COMPANY,
SEATTLE, WASH.

PATTERN MAKER

Wood, iron and aluminum patterns in Gray Iron Foundry near Philadelphia. Capable of taking complete charge. Experience necessary. Permanent position. Good salary. Address: Box 327, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Help Wanted

ATTENTION

SALESMEN to call on Grey Iron and Electric Steel Foundries. Thoroughly familiar with coke, pig iron and foundry sand and their use. Territory—California, Oregon and Washington. Please advise present connections, past experience, age and salary expected. Address: Box 428, The FOUNDRY, Cleveland 13, Ohio.

ENGINEER (Designing)

A Mechanical Engineer with foundry experience to create, completely design and supervise experimental work of molding machines and other foundry equipment. Address: Box 448, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT OR FOREMAN

Twenty years' experience gray iron, cupola practice, floor, bench and machine molding. Take complete charge. Available at once. Cleveland or Ohio district preferred. Phone Cleveland—Sweetbrier 0029 or write Box 449, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE—SUPERINTENDENT RESEARCH ENGINEER

Mature, dependable energetic, physically fit wants opportunity where ability may be fully used and remunerated. Good post war prospects leading to stock ownership. Have two engineering degrees; 12 years as Metallurgist; 18 years as Foundry Foreman, Superintendent or Manager. Experience covers wide variety grey iron, malleable, nonferrous, steel acid open hearth, arc or induction furnaces; carbon, stainless, special alloys by static centrifugal or precision casting methods; latest mechanical production foundries; personnel training. Particularly interested magnesium connection. Address: Box 429, The FOUNDRY, Cleveland 13, Ohio.

PLANT SUPERINTENDENT

Age 32 with family, college graduate. Seven years' experience with high production in grey iron and magnesium. Had experience as a time study engineer and general foreman of welding and wood shop work. At present time a foundry superintendent. Have applied to all branches of armed services but will not be taken because of height. Desires connection as superintendent or selling position. Will locate any place in United States, Canada, or South America. Can furnish excellent references. Address: Box 432, The FOUNDRY, Cleveland 13, Ohio.

PLANT MANAGER OR SUPERINTENDENT

Married, thirty-nine years of age, wife and two children, desires position with post war possibilities. Has background of twenty years' experience in gray iron. Well versed in all phases of the business both green and dry sand work. Can furnish excellent references. Prefer locating in New York, Ohio or Indiana. Address: Box 304, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY GENERAL FOREMAN

Have 26 years' practical experience iron and brass. Present time looking for position as Foundry General Foreman. Capable of handling the job. Heavy and medium green and dry sand work, iron and brass. Well known and best of references. Free to travel and can promise 100% efficiency. Address: Box 423, The FOUNDRY, Cleveland 13, Ohio.

MAGNESIUM FOUNDRY ASSISTANT SUPERINTENDENT OR GENERAL SUPERVISOR

Seven years' magnesium experience in producing high quality and quantity aircraft castings. Can organize and control. Knows latest methods and mass production equipment. Thirty-three years' practical foundry experience. Thorough in molding and coremaking, good producer, cost and scrap conscious. Desires connection with post-war possibility. Available, age 51. Willing to locate anywhere in the United States or Canada. Address: Box 381, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Thoroughly experienced in all phases of foundry operation. Light to heavy work. Green and dry sand. Practical on molding and coremaking. Thoroughly experienced in cupola control. Well versed in grey iron metallurgy and foundry costs. Thoroughly experienced in production and executive capacities. Sales, contact and expediting experience. Neat appearing and pleasing personality. Draft exempt. Address: Box 311, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPPLY & EQUIPMENT SALES REPRESENTATIVE

Twenty years' experience, AFA member, wishes to represent manufacturers of foundry supplies and equipment or allied items on the West Coast. Can furnish excellent references. Address: Box 392, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY WORKS OR GENERAL MANAGER

TECHNICAL MAN WITH SHOP AND ADMINISTRATIVE EXPERIENCE IS AVAILABLE ON SHORT NOTICE. ADDRESS: BOX 373, The FOUNDRY, CLEVELAND 13, OHIO.

PLANT MANAGER OR ASSISTANT

Age 41, metallurgical background. At present Assistant General Manager of alloy steel jobbing foundry, desires change for personal reasons. Experienced in production, customer service and sales. Interested only in organization with good post war possibilities. Address: Box 426, The FOUNDRY, Cleveland 13, Ohio.

PLANT SUPERINTENDENT

Well versed in the production of iron, malleable iron, bronze and aluminum castings desires a connection in the South or Southwest. Successful record with some of the larger producers. Responsibly employed at present but desires better health conditions for one of the members of family. For complete details address: Box 234, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON SUPERINTENDENT OR FOUNDRY FOREMAN

Thoroughly experienced wishes contact with medium size jobbing foundry on green sand and dry sand work. Also understands cupola. Thirty years as Foundry Superintendent and Foreman. Best of references, married. Address: Box 436, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON SUPERINTENDENT OR FOREMAN

Middle age, married, good habits and personality wishes contact with medium size job foundry. Qualified and dependable. Address: Box 418, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Los Angeles Foundryman desires to contact foundries or companies interested in man 42 years old with 20 years experience in iron and steel casting industry. Address: Box 442, The FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER—SALES EXECUTIVE

With valuable experience in managing, building up and maintaining foundry and machinery business on profitable basis, invites correspondence preliminary to interview. Ability to direct all office, sales, financial and production activities efficiently and economically unquestionably established by previous record. Address: Box 441, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT—MANAGER

Thoroughly experienced. Gray Iron, Steel, Cupola, Malleable and Nonferrous. Good health. Available immediately. Go anywhere. Address: Box 445, The FOUNDRY, Cleveland 13, Ohio.

NONFERROUS FOUNDRY FOREMAN

Broad practical experience including steam valves, high pressure castings, chilled castings and general jobbing and production work. Prefer position with manufacturing plant. Address: Box 160, The FOUNDRY, Cleveland 13, Ohio.

ELECTRIC STEEL MELTING SUPERINTENDENT

Desires position in Mexico. Arc or induction furnaces. Practical knowledge of foundry. Address: Box 420, The FOUNDRY, Cleveland 13, Ohio.

MALLEABLE FOUNDRY SUPERINTENDENT

Twenty years' experience as foreman and superintendent in light, medium and heavy malleable production and jobbing castings. Practical and technical. Thorough understanding of melting and mixing, rigging, gating, sand control, estimating, cost and shrink conscious for high quality work. Address: Box 273, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY MANAGER OR SUPERINTENDENT

Nineteen years of executive charge of molding, core room, cleaning department, and office in jobbing shop, casting semi-steel and grey iron castings. Best of references. Address: Box 446, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thirty-two years' Foundry experience. Twenty-five years as Foundry Superintendent. Capable of taking complete charge of all foundry operations, both ferrous and nonferrous. At present employed as Foundry Superintendent. Could make a change on a thirty-day notice. Good connection more important than a large salary. Location not important. Can be interviewed at the Foundrymen's Convention. Address: Box 447, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS

This advertising service of 34 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

Opportunities

WANTED

FOR PATENTED PRODUCT

Manufacturer with Foundry and National Sales Outlet for new type segment Grate 4 and 8 lbs. each, ½ to 3 tons each unit. Truncated cone burning surface for Locomotives, Great Lake Steamships and Stationary Boilers.

Approved and now in use by New York Board of Education who will recommend product as best they ever used. Phone Mr. McCarthy, Boiler Inspector—Eldorado 5-3557.

Don't reply unless you have large volume plant.

BOX 427

The FOUNDRY 16 E. 43RD ST.

NEW YORK 17, N. Y.

OPPORTUNITIES

Excellent opportunity for Gray Iron Foundry with machine shop to enter Automotive Replacement parts field. Established business in excess of $400,000 a year. Have Patterns and other equipment for casting. Have tools-jigs, fixtures for machining. All available for use or sale at a small fraction of cost. Will manage sales end on commission. Casting requirements over 20 tons daily.

BOX 433

The FOUNDRY CLEVELAND 13, OHIO

Wanted-To-Buy

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

U. S. Rotary Melting Furnace No. 3. Address: Beeman Foundry Co., 1739 N. W. 3rd St., Oklahoma City, Okla.

Classified Advertising

Wanted-To-Buy

WANTED

Used 1000 pound per hour electric melting furnace with or without transformer. Address: Box 371, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Sand Cutter for Molding Floors—Must be in First Class Condition. Send full particulars to D. J. Murray Manufacturing Co., Wausau, Wisconsin.

Foundry - Sale - Lease

FOR SALE

In West Coast area, well equipped nonferrous Foundry and wood and metal Pattern Shop. Accommodates 35 or more employees. Doing excellent business, established over 24 years. Owner wants to retire. Approximate price $100,000.00. Address: Box 424, The FOUNDRY. Cleveland 13, Ohio.

LEASE OR FOR RENT

Small iron foundry fully equipped. Address: Box 439, The FOUNDRY, Cleveland 13, Ohio.

For Sale

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo, Mich.

FOR SALE

1—Used Single phase Electric Steel Furnace complete with transformers, 12,000 volt primary. Automatic Electrode Control, etc. Purchased new May 1942. Has been producing 7 tons daily. Can make shipment within 3 days. Price F.O.B. shipping point $5500. Address: Box 161, The FOUNDRY, Cleveland.

SPECIAL DEFENSE BARGAINS

Cast Iron and Steel Plate Mill-Dust & Shavings Exhausters 50 in stock. **Cupola and Furnace** Blowers for Coke, Oil or Gas Combustion.

1—Spencer blower 3600 CFM @ 1½ lbs.—40 h.p. motor, and blast gate. 3/60/220 or 440.
1—Spencer Blower 2250 C.F.M.—1½ lbs.—25 H.P. 3/60/220 or 440 AC.
2—Sprague 4 Ton Electric Hoists 115 V. D.C.
1—Sprague 2 Ton Electric Hoist 115 V.—D.C.

Furnaces:

1—US Rotary No. 3—Melting or Smelting.
1—Pair Monarch-Rockwell's—Rotating, each 500 lbs. cap. mounted together on base, oil burners available, when used together waste heat from one preheats other.
1—Hausfeld open flame, non crucible 400 lbs. brass capacity or equivalent volume for Aluminum.
1—Stationary for No. 70 crucible.
1—Schwartz, size 42" class A—for oil fuel.

Tumbling Mills—2 cast iron for brass cleaning.

1—Sly 48" x 60"—1" thick round steel shell.
2—36" dia. x 60" round steel shell.

Core Ovens:

1 each—"Buckeye" and "Hill & Griffith" portable semicircular styles 5 shelves each.
1—Core Sand Mixer, Triumph make (dough mixer type) approx. 5 cu. ft. cap. 3—H.P. motor geared direct, 3/60/220 A.C.

Molding Machines:

1—Battenfeld stationary 17" x 22" platen—jolt-squeeze.
2—Osborn Portable No. 75-J.
2—Osborn Portable No. 76 air squeeze only.
1—Arcade portable or stationary plain air squeeze.
1—Stationary small jolt table for cores.
1—Tabor jolt Table No. B-18 54" x 96".
1—Jolt Table 12" cyl. 40" x 60" table.
1—Jolt Table 16" cyl. 42" x 60" table.
1—Osborn No. 405 stationary jolt-rollover draw.

Compressors:

1—Chicago 7½" x 6" 106' capacity, 100 lbs.
1—Chicago 12" x 8" 240' cap., 70 lbs.
1—Worthington Feather Valve 150' cap., 100 lbs.
1—Chicago—8" x 8"—Horizontal, 128'—100 lbs.
1—Chicago—6" x 6"—50' cap.
1—Worthington 2 stage 450' cap.

Gardner 4½" x 4½" Vertical 19'.

Tested-air receivers—12" up to 36" dia.

CLIFTON MACHINERY CO.
1023 W. 6TH, CINCINNATI 3, OHIO

For Sale

FOR SALE

1—Elwell-Parker furnace charger, type LF tructor, 6000 lb. capacity.
1—Elwell-Parker furnace charger, type LF tructor, 4000 lb. capacity.
1—Crescent electric lift truck, platform size 26 x 55 x 11.
1—Link Belt electric hoist, 1000 lb. capacity, 25 ft. lift, 220—3 ph. 60 cy.
500 ft. American Monorail including switches.

INDUSTRIAL TRADING CO.

942 W. LAKE ST. CHICAGO 7, ILL.

COMPRESSORS AND BLOWERS

2100 cfm @ 12 oz. Gen. Elec. Centrifugal compressor with 10 HP 2-60-3450 RPM motor.
2—1200 cfm @ 11 oz. Buffalo Pressure Blowers, 9½" intake 7" x 7¼" outlet, with 7½ HP 3-60-1800 RPM motors.

SAND VIBRATOR

7 to 8 ton per hours, Jeffery-Traylor with vibrator M.G. set. Write, wire or phone.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE., CLEVELAND 14, OHIO

FOR SALE

1—No. 175 Osborn jolt squeeze strip, portable.
1—No. 405 Osborn jolt rollover.
Osborn J-75 jolt squeezers.
Osborn J-76 jolt squeezers.
1—Type "R" 14" x 8" draw, International, hand roll, hand jolt, hand draw.
1—Type "JS" 4 Jolt squeezer, International, portable.
3—Pridmore hand ram, hand roll, foot draw, rollover machines.
1—Pridmore rollover 48" x 60", 14" draw.
1—Davenport stripper 40" wide, 14" draw.
1—Tabor jolt squeezer.
1—Tabor plain bumper, 5' square table.
Tabor jolt strippers.
1—Nichols jolt strip squeezer.
Nichols jolt squeezers.
Milwaukee jolt squeezers.
1—Plain Bumper, 18 x 24 table.
1—Otis Elevator 2000 lb. capacity, 5 H motor.
2—Band Saws.
3—20" Coombs Electric Riddles.
1—24" Coombs Electric Riddle.
1—Gas fired ladle dryer, 10 burners.
2—Ladle Dryers, one for oil, one for gas.
1—Lockwood Tier Lift electric battery Truck, 1 ton lift capacity.
Lift Trucks, all sizes with iron wheels and rubber tires.
32—Riveted Steel Skids.
1—Double End Grinder, 16" wheels, 37" between wheels, motor driven.
1—Double End Grinder, direct drive, motor driven.
1—Crescent Disc Grinder, roller bearing, motor driven.
1—Buffalo Transverse testing machine.
1—Foxboro Blast Regulator, practically new.
1—Buffalo blower and motor, direct drive with 20 H motor, practically new.
High speed motor and blower for brass furnaces, several different sizes.
1—Sly Mfg. Co., PD Sand Blast Barrel.
1—Pangborn 6' Sand Blast Table.
1—Ingersoll-Rand 6 x 4 Air Compressor, motor and tank.
1—Curtis upright 6 x 6 Air Compressor, motor and tank.
1—Tessemer Sprue Cutter.
1—20" Exhaust Fan, motor driven, direct drive, practically new.
1—24" x 48" tumbling mill, 1" shell.
1—36" x 60" tumbling mill, 1" shell.
1—42" x 42" x 62" square mill, ¾" shell, friction clutch.
Tumbling mills of all sizes, plain bearing and roller bearing.
Blystone Sand Mixers, 5 and 7 cu. ft. capacity.
1—Whiting 3½ ton tea-pot lip latest style pouring ladle.

HAYNES FOUNDRY EQUIPMENT CO.
1734 LAKE ST. KALAMAZOO 21, MICH.

For Sale

REBUILT EQUIPMENT IN STOCK
IMMEDIATE SHIPMENT

(1)—3-ton geared crane type Ladle.
(2)—¾" cap. Power Sprue Cutters.
(1)—10" Tabor Post Type Squeezer.

ELECTRIC MONORAIL HOISTS

(2)—3-ton Euclid 110/230-VDC.
(3)—1-ton Shepard, 230-VDC.
(2)—1-ton Shepard stationary mounted Hoists. Separate variable speed controllers.
(1)—1-ton 2-motor Cleveland Tramrail, 230-VDC. FL. OR CAGE OPERATED.

BUCKETS

(1)—¾-yd. 2-line Browning type Z-½.
(1)—¾-yd. Hayward Electric 220-VAC.
(2)—1½-yd. Hayward Electric 230-VDC.
(1)—2-yd. Hayward Electric 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

	TONS	MAKE	SPAN	CURRENT
(1)	3	Shaw	30'0"	230-VDC.
(2)	3	Euclid up to	40'0"	A.C. or D.C.
(1)	5	Euclid	30'11"	220-VAC.
(1)	5	P & H	54'1½"	230-VDC.
(1)	10	Erie	80'0"	220-VAC.

(150' of A-Frame OUTDOOR RUNWAY WITH THIS CRANE)

SPECIAL: 3—5-ton Jib Cranes, masts 23'8" Boom 19'2", Rebuilt, wired with 1 to 5-ton A.C. or D.C. Electric Hoists.

WE OWN AND HAVE ALL THIS EQUIPMENT IN STOCK. IT IS OFFERED REBUILT IN OUR LARGE MODERN PLANT AND FULLY GUARANTEED.

T. B. MacCABE CO. 4304 CLARISSA ST.
PHILADELPHIA (40) PENNA.

FOR SALE

1—3-ton Geared Ladle.
1—8-ton Geared Ladle.
1—Whiting Standard Mixing Ladle 18" radius x 64" long—excellent condition.

BAKER PERKINS INC.

Saginaw -:- Michigan

FOR SALE

1—Type LD-1 Pangborn Table Sand Blast. Good condition, low price. Address: Box 425, The FOUNDRY, Cleveland 13, Ohio.

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
406 N. Peoria St. Chicago, Ill.

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.
ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

TANKS BOUGHT AND SOLD

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

FOR SALE

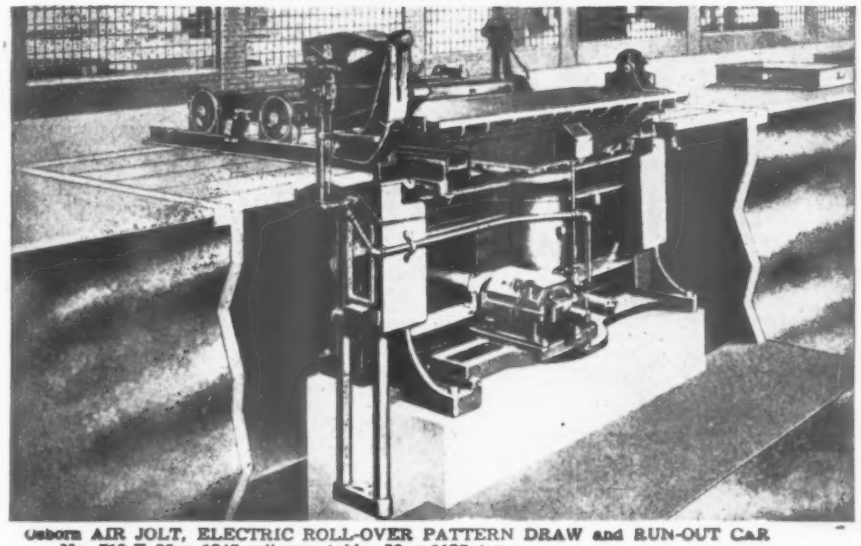
Hydro-Blast, Barrel Type, complete with pump and accessories. This unit was purchased about a year ago and will clean 700 lbs. of castings in ten minutes. Due to our increased production this unit does not have sufficient capacity. Will be available within four weeks and can be seen in operation. Cost $3150.00 a year ago—price $2000.00 f.o.b. Rock Island, Ill.

ROCK ISLAND METAL FOUNDRY
ROCK ISLAND ILLINOIS

SCULLY Reconditioned Foundry Equipment

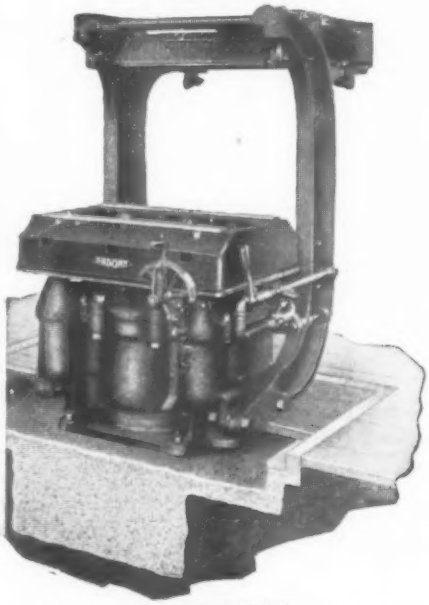
★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

OSBORN JOLT SQUEEZE & POWER STRIP



No. 703 OSBORN
(Similar to above excepting with roll-off)
No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary. Length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolting cap. @ 80 lbs. press. Distance from lifting frame to squeeze head 24¼", flask length 44⅛" with roll-off conveyor.
No. 703-5 Osborn, same as above, excepting 17 x 35" table.

No. 8 DEMMLER CORE BLOWER, open throat frame—stationary sand magazine—12" dia. opening at top, 17" core box clamping cyl.—with 12" max. draw—cyl. hydraulically controlled—with aux. exhaust valve, largest core will blow 30" long x 18" wide x 9" deep.

MISC. MOLDING MACHINES

No. 112 Arcade portable jolt roll-over and squeeze, pattern draw, table accommodates pattern plates up to 13 x 33"—9" draw, distance between uprights 36".

Arcade No. 10-040 jolt roll-over and squeeze, pit type, 44" distance between uprights, 20 x 34" jolt table, 7" jolt cyl., 18" draw, 42" distance head to swing table.

22" Tabor portable, jar roll-over and draw, 22 x 32" roll-over plate, 600 lbs. cap @ 80 lbs. pressure, 10" draw.

No. 22 Davenport, jolt roll-over draw, 20 x 30" table, 750 lbs. cap. @ 80 lbs. press., 10" draw.

No. 602 Osborn jolt roll-over draw, portable, 24 x 30" flask cap., 900 lbs. cap. @ 80 lbs. press., 10" draw.

Pridmore 30 x 42" power turn-over and drop Electrically operated 24 x 32" jarring machine, 2 HP 220V AC Motor.

Herman Independent Turn-Over and Pattern Drawing Device, 40 x 56" roll-over, 40 x 56" bumper, 3000 lbs. jolting cap. 24" draw.

PLAIN AIR SQUEEZERS

Tabor portable, 32" between rods, 10" cyl., 16 x 17" table.

JOLT SQUEEZERS

No. 76 Arcade straddle portable type with swing-head, 17 x 20" table, 10" dia. cyl.

No. 75-J Osborn, portable, 36" between rods, 10" dia. cyl., 15 x 19" table.

PLAIN JARRING MACHINES

36 x 48" Osborn, 9" dia. cyl. 2000 lbs. cap. @ 80 lbs. press.

60 x 60" Tabor, 14" dia. cyl., 8500 lbs. cap. @ 80 lbs. press.

42 x 60" Tabor, 13" dia. cyl., 7500 lbs. cap. @ 80 lbs. press.

Pangborn 6 ft. dia. TYPE EH-1 CABINET TABLE INSTALLATION, 5 ft. high partition, Abrasive Handling and Reclamation System, Belt and Bucket Type Elevator, Sandblast Pressure Tank.

AMERICAN SANDCUTTERS

Cleveland-American (similar to Model "K") 84" spiral cutting cyl., 36" dia., 92" between tractor wheels, 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

Cleveland-American 4-motor Model F-Type 113-92, 80" cutting cyl., 8½ ft. between tractor wheels, 220V AC Motors, Cable and Reel.

American Fdry. Model "K" heavy duty type, size 72, equipped with Buda Type "WTU" 20 HP Gas Engine. 72" between tractor wheels. 6" face, having 60" cutting cyl.

CORE TURN-OVER MACHINES

Pridmore Type "H" 22 x 18—8" drop, portable rock-over drop.

MISC. HAND ROLL-OVER MACHINES

International Type "R" 24 x 10" draw, portable, special core turn-over.

Tabor, portable, hand roll-over, hand draw, 1—16-18—8" draw, 1, as above, 20-22—8" draw.

JOLT SQUEEZE STRIPPERS

No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 35" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

Osborn No. 550-22 pit type JOLT STRIPPER, stationary pin centers 16 x 32"—table 32 x 36".

JOLT STRIPPER

Herman, heavy duty type, will take flasks 42" long x 42" wide—3000 lbs. jolting cap. @ 90-100 lbs. press—can be arranged to handle flasks up to 45" x 70".

Osborn No. 451—10" pattern draw, 28 x 40" table size, 750 lbs. jolting cap.

42" dia. x 60" long Whiting Exhaust Tumblers, door opening entire length of mill, approx. 1" plate.

SCULLY MACHINERY & EQUIPMENT CORP.
(Formerly - Foundry Division of Scully-Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO 36, ILLINOIS

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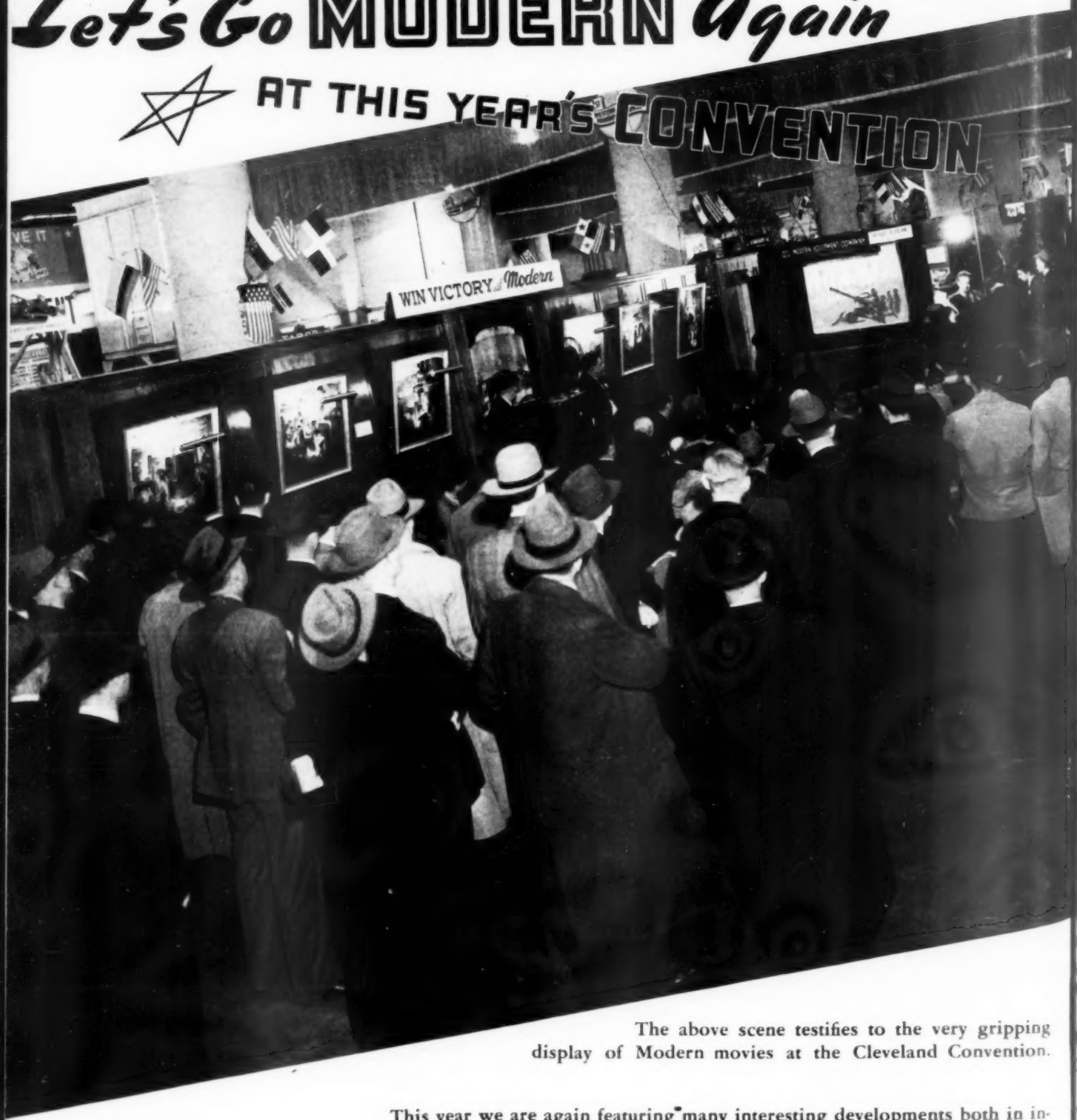

The above scene testifies to the very gripping display of Modern movies at the Cleveland Convention.

This year we are again featuring many interesting developments both in industrial and world affairs. New Modern equipment applications will appeal to you. Interesting scenic and war views will thrill you.

Come in and relax from your arduous tasks at Modern Booth Nos. 13-15-17

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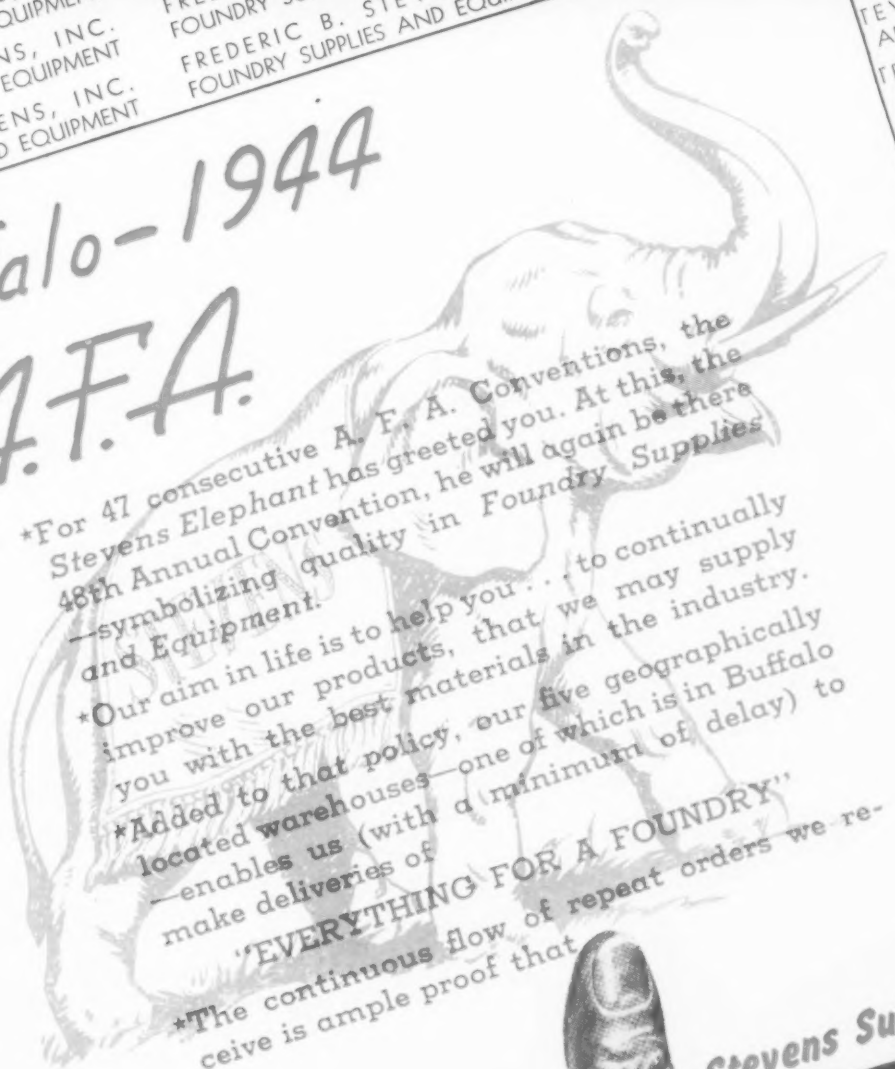

*For 47 consecutive A. F. A. Conventions, the Stevens Elephant has greeted you. At this, the 48th Annual Convention, he will again be there —symbolizing quality in Foundry Supplies and Equipment.

*Our aim in life is to help you . . . to continually improve our products, that we may supply you with the best materials in the industry.

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● LOGISTICS . . . a military word . . . has its counterpart in Industry — it's CONVEYING. Getting materials, parts, assemblies and finished products from "here to there" in proper coordination with various steps in the production cycle, conserving power and time, multiplying production and aiding the worker, are the fundamentals of mass production.

Now, with a war to win, America is fortunate to have this technique so highly developed, with specialized types of conveyors to meet the widely diversified needs and conditions of industry.

Link-Belt Company has played an important part in this development, and Link-Belt Conveyors of every type are aiding countless war plants today to turn out more and still more urgently needed supplies for every phase of our war effort.

Link-Belt mass-production engineers are ready to confer with you on any conveying or sand preparation problem.

LINK-BELT COMPANY

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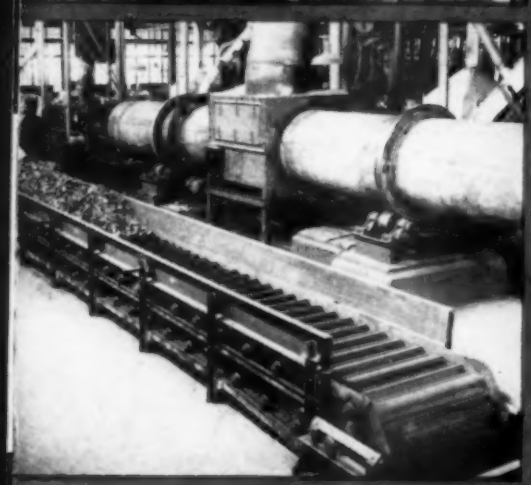
Atlanta San Francisco 24 Toronto 8

Mechanical handling of molds on Link-Belt mold conveyors (several types to fit various conditions) through closing, clamping, pouring, cooling and shake-out operations, increases output and reduces manual effort.

Distributing belt conveyors with adjustable scraper discharge plows deliver prepared sand to any number of molding stations in proper quantities. Hoppers, gates, and chutes are adjustable to different types of molding machines and building clearances.

Shown is one finishing station on Link-Belt overhead trolley conveyor. Link-Belt conveyors of this type, being suspended from overhead, turn ceilings into producing areas—travel irregular paths at predetermined speeds to meet continuous production requirements.



Link-Belt apron conveyors handling hot castings from shakeout to continuous anneal, sorting and cleaning to shipping. Years of trouble-free service under the rigors of high temperatures and abrasive action have proved their durability and efficiency.

Production molding machine line for magnesium castings. As in this installation proper design and layout of sand and mold handling equipment is a basic requirement to assure maximum utilization of man-hours and production from machine patterns.

LINK-BELT CONVEYORS